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Deep-Water Atlantic Anthuridea (Crustacea; Isopoda)

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BRIAN KENSLEY

SMITHSONIAN CONTRIBUTIONS TO ZOOLOGY • NUMBER 346

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Deep-Water Atlantic Anthuridea (Crustacea: Isopoda)

Brian Kensley

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ABSTRACT

Kensley, Brian. Deep-Water Atlantic Anthuridea (Crustacea: Isopoda). *Smithsonian Contributions to Zoology*, number 346, 60 pages, 35 figures, 9 plates, 1982—The largest single collection of Atlantic deep-water anthuridean isopods is recorded. Six genera and nine species (including *Cetanthura*, new genus, and *Cetanthura foveoderma*, *Cyathura profunda*, *Malacanthura cantabrica*, *Malacanthura antarctica*, *Ocsanthura gracilis*, and *Quantanthura sinuata*, new species) in the family Anthuridae, and five genera and 11 species (including *Bullowanthura aquitanica*, *Leptanthura argentinae*, *Leptanthura guianae*, *Leptanthura micrura*, and *Pseudanthura recifensis*, new species) in the family Paranthuridae, are described. The poorly known *Malacanthura truncata* (Hansen) and *Leptanthura affinis* (Bonnier) are redescribed. A brief review of the genus *Malacanthura* sensu stricto is provided, with a revised diagnosis. The genus *Bullowanthura* is recorded for the first time from the Atlantic Ocean. Aspects of the biology, including growth classes, sexual maturity, and protogyny of the only known deep sea species of *Cyathura* are presented. The distribution and evolution of anthurids in the deep sea and their apparent derivation from shallow-water forms, as illustrated in the genus *Malacanthura*, is discussed. A list of Atlantic anthurideans occurring in depths of more than 300 m is provided.

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Contents

	Page
Introduction	1
Acknowledgments	2
Species and Station List	2
Family ANTHURIDAE	3
Cetanthura, new genus	3
Cetanthura foveoderma, new species	4
Genus *Cyathura*	4
Cyathura profunda, new species	4
Genus *Malacanthura*	12
Malacanthura antarctica, new species	12
Malacanthura cantabrica, new species	15
Malacanthura truncata (Hansen)	17
Genus *Ocsanthura*	20
Ocsanthura gracilis, new species	20
Ocsanthura vimsae Kensley	23
Genus *Quantanthura*	23
Quantanthura sinuata, new species	23
Genus *Valoranthura*	26
Valoranthura abyssorum (Norman and Stebbing)	26
Family PARANTHURIDAE	26
Genus *Bullowanthura*	26
Bullowanthura aquitanica, new species	26
Genus *Calathura*	29
Calathura brachiata (Stimpson)	29
Genus *Leptanthura*	29
Leptanthura affinis (Bonnier)	29
Leptanthura argentinae, new species	32
Leptanthura glacialis Hodgson	35
Leptanthura guianae, new species	37
Leptanthura micrura, new species	37
Genus *Paranthura*	42
Paranthura argentinae Kussakin	42
Paranthura possessia Kensley	42
Genus *Pseudanthura*	42
Pseudanthura lateralis Richardson	42
Pseudanthura recifensis, new species	44
Distribution	48
Literature Cited	50
Plates	52

Deep-Water Atlantic Anthuridea (Crustacea: Isopoda)

Brian Kensley

Introduction

Except in intertidal and shallow infratidal areas where concentrated collecting is possible, anthuridean isopods are usually represented in very low numbers in most samples. Many species, even recently, have been based on one or two specimens. For these reasons, the present collection from 47 deep Atlantic stations, with large numbers of specimens of several of the species, is both unusual and important, being the largest single collection of deep-water anthurideans yet made. It is without precedent for a single species from 500–5000 m to be represented by about 1500 specimens.

Most of the material dealt with in this paper comes from the Woods Hole Oceanographic Institution's Atlantic deep sea survey, with transects off Guyana; Recife, Brazil; Montevideo, Uruguay; Senegal, west Africa; Walvis Bay, South West Africa (Namibia); with additional material from the Bay of Biscay (Allen stations) and the Weddell Sea (Rankin stations). The material was made available to the Smithsonian Institution by Dr. R. R. Hessler of the Scripps Institution of Oceanography (SIO). Holotypes and paratypes are housed in the Smithsonian Institution and bear USNM catalog numbers; additional paratypes have been deposited in the Zoological Museum of the University of Copenhagen (ZMC); voucher specimens have been deposited at the Scripps Institution of Oceanography, La Jolla, California.

In descriptions as well as listings of material, specimens have been differentiated into the following six stages:

1. Manca: immature specimens lacking the seventh pereopod and with the seventh pereonite short
2. Juvenile: post-manca stage having the seventh pereopod developed, but lacking either masculine or feminine secondary sexual characters
3. Ovigerous female: a specimen having a marsupium formed by three or four pairs of pereonal oostegites
4. Non-ovigerous female: female with the same total body length as an ovigerous female (distinction made only when ovigerous females of same species available)
5. Submale: a specimen at a stage between female and mature male, having the antennular flagellum elongated but lacking whorls of aesthetascs
6. Male: a specimen showing whorls of aesthetascs on the elongate antennular flagellum, and often, the first pereopod having heavier setation/spination than in the female

For a number of species dealt with in the following systematic discussion, both line figures and scanning electron micrographs have been provided. I am aware of the problems of using SEM's in taxonomic work, especially as not all taxonomists have access to these instruments. However, the value of SEM's has been proven in revealing fine structure, especially of appendages and integumental organs. This value will increase

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when taxonomically intractable groups, e.g., the anthuridean genera *Paranthura* and *Apanthura*, are tackled. In such morphologically very similar groups, fine structure and subtleties of surface detail may well prove invaluable in separating taxa.

In the following systematic discussion, the genera and species are arranged in alphabetical order. Measurements in the "Material" sections are always for total body length measured middorsally from rostral tip to telsonic apex.

ACKNOWLEDGMENTS.—My sincere thanks are due to Drs. R. R. Hessler and G. D. Wilson, Scripps Institution of Oceanography, for making this collection available for study; to Mrs. Cynthia Brown and Miss Marilyn Schotte, who assisted with the illustrations; to the staff of the Smithsonian Scanning Electron Microscopy Laboratory and especially Miss Mary Jacque Mann, for the electron micrographs; to Mr. Michael Carpenter of the Department of Invertebrate Zoology, for photographic assistance; and to Dr. Lee-Ann Hayek of the Smithsonian Office of Computer Services, for statistical advice. Drs. T. E. Bowman, R. F. Cressey, R. R. Hessler, and G. D. Wilson read the manuscript; for their many useful comments and criticisms I am very grateful.

Species and Station List

Sta Allen 33, Bay of Biscay, 43°40′N 3°36′E, 1784 m
Leptanthura affinis (Bonnier)

Sta Allen 40, Bay of Biscay, 43°36′N 3°25′E, 860m
Bullowanthura aquitanica, new species

Sta Allen 44, Bay of Biscay, 43°40′N 3°35′E, 1739 m
Leptanthura affinis (Bonnier)
Malacanthura cantabrica, new species
Malacanthura truncata (Hansen)

Sta Allen 56, Bay of Biscay, 43°43′N 3°48′E, 641 m
Bullowanthura aquitanica, new species

Sta Allen 61, Bay of Biscay, 46°20′N 4°35′E, 952 m
Calathura brachiata (Stimpson)

Sta Allen 65, Bay of Biscay, 46°15′N 4°49′E, 1922 m
Leptanthura affinis (Bonnier)

Sta Allen 6697, Canary Islands, 27°57′N 13°46′W, 1564 m
Leptanthura species

Malacanthura truncata (Hansen)

Sta Allen 6701, Canary Islands, 27°45′N 14°13′W, 1934 m
Leptanthura affinis (Bonnier)
Leptanthura species
Ocsanthura vimsae Kensley

Sta Allen 6704, Canary Islands, 27°45′N 14°25′W, 2129 m
Leptanthura affinis (Bonnier)

Sta BER. 2, Bermuda Rise, 32°16′N 64°36′W, 1700 m
Ocsanthura gracilis, new species

Sta BER. 3, Bermuda Rise, 32°16′N 64°36′W, 1700 m
Ocsanthura gracilis, new species

Sta BER. 4, Bermuda Rise, 32°17′N 64°35′W, 1700 m
Ocsanthura gracilis, new species

Sta BER. 6, Bermuda Rise, 32°14′N 64°42′W, 1500 m
Oscanthura gracilis, new species

Sta Ch35 Dr12, off Recife, Brazil, 7°09′S 34°25′W, 770–805 m
Leptanthura glacialis Hodgson

Sta Ch35 Dr33, Guiana Basin, 7°52′N 54°31′W, 520–550 m
Leptanthura micrura, new species
Leptanthura species
Malacanthura truncata (Hansen)
Quantanthura sinuata, new species

Sta Ch35 Dr34, Guiana Basin, 8°45′N 53°44′W, 1500 m
Leptanthura micrura, new species

Sta I.O. DAL. 13, north of King George Island, South Shetland Islands, 61°30′S 58°00′W, 282 m
Leptanthura glacialis Hodgson
Paranthura species

Sta E3, off New Jersey, 39°50′N 70°35′W, 823 m
Calathura brachiata (Stimpson)

Sta Rankin 0001, Weddell Sea, 74°28′S 30°31′W, 513 m
Leptanthura glacial[illegible] Hodgson
Paranthura specie[illegible]

Sta Rankin 0004, Weddell Sea, approx. 75°S 54°W, 476 m
Malacanthura antarctica, new species

Sta Rankin 0006, Weddell Sea, 76°49′S 40°55′W, 513 m
Malacanthura antarctica, new species

Sta Rankin 0011, Weddell Sea, 74°00′S 54°55′W, 454 m
Malacanthura antartica, new species

Sta 96, off New Jersey, 39°55′N 70°40′W, 498 m
Colanthura species

Sta 142, Sierra Leone Basin, 10°30′N 17°52′W, 1710 m
Leptanthura affinis (Bonnier)
Leptanthura species
Malacanthura truncata (Hansen)

Sta 145, Sierra Leone Basin, 10°36′N 17°49′W, 2185 m
Leptanthura affinis (Bonnier)

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Sta 159, off Recife, Brazil, 7°58′S 34°22′W, 887 m
Leptanthura micrura, new species
Leptanthura species

Sta 162, off Recife, Brazil, 7°58′S 34°06′W, 1439 m
Leptanthura micrura, new species
Leptanthura species

Sta 167, off Recife, Brazil, 7°54′S 34°16′W, 975 m
Leptanthura micrura, new species

Sta 169, off Recife, Brazil, 8°03′S 34°24′W, 587 m
Leptanthura micrura, new species
Pseudanthura recifensis, new species

Sta 188, off South West Africa, 23°00′S 12°58′E, 620 m
Cetanthura foveoderma, new species

Sta 191, off South West Africa, 23°04′S 12°31′E, 1553 m
Pseudanthura lateralis Richardson

Sta 192, off South West Africa, 23°01′S 12°19′E, 2136 m
Pseudanthura lateralis Richardson

Sta 197, Angola Basin, 10°28′S 9°04′E, 4596 m
Valoranthura abyssorum (Norman and Stebbing)

Sta 201, Angola Basin, 9°27′S 11°35′E, 1998 m
Leptanthura species

Sta 209, off New Jersey, 39°46′N 70°49′W, 1597 m.
Calathura brachiata (Stimpson)

Sta 236, Argentine Basin, 36°27′S 53°31′W, 508 m
Cyathura profunda, new species
Paranthura argentinae Kussakin
Paranthura possessia Kensley

Sta 237, Argentine Basin, 36°33′S 53°22′W, 1002 m
Cyathura profunda, new species
Leptanthura argentinae, new species
Leptanthura glacialis Hodgson
Ocsanthura vimsae Kensley
Paranthura possessia Kensley

Sta 242, Argentine Basin, 38°16′S 51°55′W, 4392 m
Leptanthura argentinae, new species
Leptanthura glacialis Hodgson

Sta 245, Argentine Basin, 36°55′S 53°01′W, 2707 m
Cyathura profunda, new species
Leptanthura argentinae, new species
Paranthura possessia Kensley

Sta 247, Argentine Basin, 43°33′S 48°58′W, 5216 m
Leptanthura glacialis Hodgson

Sta 256, Argentine Basin, 37°40′S 52°19′W, 3912 m
Leptanthura glacialis Hodgson

Sta 259, Argentine Basin, 37°13′S 52°45′W, 3311 m
Leptanthura argentinae, new species

Sta 262, Argentine Basin, 36°04′S 52°18′W, 2460 m
Cyathura profunda, new species
Leptanthura argentinae, new species
Paranthura possessia Kensley

Sta 264, Argentine Basin, 36°13′S 52°43′W, 2045 m
Cyathura profunda, new species
Paranthura possessia Kensley

Sta 293, Guiana Basin, 8°58′N 54°04′W, 1487 m
Leptanthura guianae, new species
Leptanthura species

Sta 295, Guiana Basin, 8°04′N 54°20′W, 1011 m
Leptanthura guianae, new species

Sta 297, Guiana Basin, 7°45′N 54°24′W, 516 m
Leptanthura guianae, new species
Leptanthura species
Malacanthura truncata (Hansen)
Ocsanthura vimsae Kensley

Sta 301, Guiana Basin, 8°12′N 55°49′W, 2494 m
Leptanthura micrura, new species

Sta 326, southwest of Ireland, 50°05′N 14°26′W, 3859 m
Valoranthura abyssorum (Norman and Stebbing)

Family ANTHURIDAE

Cetanthura, new genus

DIAGNOSIS.—Eyes present. Antennular flagellum of two articles. Antennal flagellum of four articles. Mandibular palp 3-segmented; incisor, lamina dentata, and molar present. Maxilliped 4-segmented, endite absent. Pereopods 1–3 similar, neither robust nor subchelate, propodi barely expanded. Pereopods 4–7 with rectangular carpi not underriding propodi. Pleopod 1 exopod operculiform. Pleonites 1–5 fused, 6 free. Telson with two basal statocysts.

TYPE-SPECIES.—*Cetanthura foveoderma*.

GENDER.—Feminine.

REMARKS.—The diagnoses of *Cetanthura* and *Haliophasma* agree in all but two features. Even the integument is pitted, as is often the case in *Haliophasma*. However, the form of pereopod 1, being ambulatory and having an unexpanded propodus, differs markedly from the robust subchelate pereopod 1 of *Haliophasma* (see Poore, 1975). The maxilliped lacks the small semicircular terminal segment of *Haliophasma*, while the proximally narrowed third segment resembles the condition in *Malacanthura*. The low, unsclerotised, mandibular molar is weaker and more elongate

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than is usually seen in *Haliophasma* or *Malacanthura*.

ETYMOLOGY.—This material was collected in the vicinity of Walvis Bay and the Walvis Ridge, in the south-east Atlantic, hence the Latin *cetia* (whale = Dutch *walvis*) is added to the commonly used suffix *-anthura*.

Cetanthura foveoderma, new species

FIGURES 1, 2

MATERIAL.—Holotype: USNM 185016, Sta WHOI 188, 1♂, 6.5 mm. Paratypes: USNM 185017, Sta WHOI 188, 4 juvs, 3.0–4.0 mm; ZMC, Sta WHOI 188, 2 juvs, 3.0–4.0 mm; SIO, Sta WHOI 188, 2 juvs, 3.0–4.0 mm.

DESCRIPTION.—*Juvenile:* Integument moderately indurate, with numerous shallow scattered pits. Body proportions: C < 1 < 2 = 3 < 4 = 5 > 6 > 7. Pleonites 1–5 fused, indicated by short lateral epimera; pleonite 6 free, with middorsal slit in posterior margin. Telson elongate-oval, distally rounded with few terminal setae, dorsally gently convex, with midventral ridge in distal half; two basal statocysts present. Dorsolateral eyes with 7–8 almost unpigmented ocelli.

Antennular peduncle with three broad segments, basal segment longest, fourth segment short, set obliquely on third; flagellum of two articles, tiny terminal article bearing three aesthetascs. Antennal peduncle of five broad segments, fifth longest; flagellum of four setose articles. Mandibular palp 3-segmented, second segment longest and broadest, terminal segment with two distal fringed spines; incisor of three cusps; lamina dentata of six serrations; molar low, rounded. Maxilla with six distal spines. Maxilliped 4-segmented, second segment longest; endite lacking; terminal segment distally rounded, with six setae. Pereopods 1–3 similar, unguis one-quarter length of dactylus; propodus not inflated, concave palm unarmed. Pereopods 4–7 with dactyli and propodi bearing fringed scales on posterior margin; carpi rectangular, not underriding propodi. Pleopod 1 exopod operculiform; endopod about half width of and slightly shorter than exopod; basis with three retinaculae. Uropodal exopod elongate-oval, outer margin scalloped, bearing fringed setae, reaching just beyond distal margin of basis; latter strongly triquetrous; endopod not reaching telsonic apex, margin scalloped.

Male: Antennule reaching middle of pereonite 2, with 10 flagellar articles bearing whorls of fine aesthetascs. Pereopod 1 similar to female, but with 17 serrate spines on inner surface of propodus. Pleopod 2 endopod with slender, apically narrowly rounded, copulatory stylet reaching distal margin of ramus. Uropodal exopod and endopod more slender than in female, outer exopod margin sinuate, apex subacute.

ETYMOLOGY.—The specific name refers to the pitted integument.

Genus *Cyathura*

Cyathura profunda, new species

FIGURES 3–5; PLATES 1–3

MATERIAL.—Holotype: USNM 185036, Sta WHOI 237, 1 ♂, 16.5 mm. Allotype: USNM 185037, Sta WHOI 237, 1 ovig. ♀, 10.5 mm. Paratypes: USNM 185038, Sta WHOI 237, 10 ♂, 10.5–17.5 mm, 10 ovig. ♀, 9.0–11.0 mm; ZMC, Sta WHOI 237, 10♂, 10 ovig. ♀. Additional material: SIO, Sta WHOI 236, 42 ovig. ♀, 122 ♂, 422 non-ovig.♀ and juvs.; Sta WHOI 237, 27 ovig. ♀, 110 ♂, 567 non-ovig. ♀ and juvs; Sta WHOI 245, 4 ovig. ♀, 8 ♂, 84 non-ovig. ♀ and juvs; Sta WHOI 262, 5 ovig. ♀, 22 ♂, 86 non-ovig. ♀ and juvs; Sta WHOI 264, 1 ♂, 53 non-ovig. ♀ and juvs.

DESCRIPTION.—*Ovigerous Female:* Integument indurate, bearing numerous tiny spinose tubercles. Body proportions: C < 1 = 2 > 3 < 4 > 5 > 6 > 7. Cephalon, pereon, and pleon with shallow irregular grooves. Cephalon with rostrum and anterolateral lobes demarked by strong groove; eyes lacking. Pleonites 1–5 fused, segments indicated by short epimera and interrupted irregular dorsolateral grooves; pleonite 6 lacking free lateral margins, with strong middorsal slit in posterior margin, fused to telson middorsally. Telson with margins gently tapering to broadly rounded

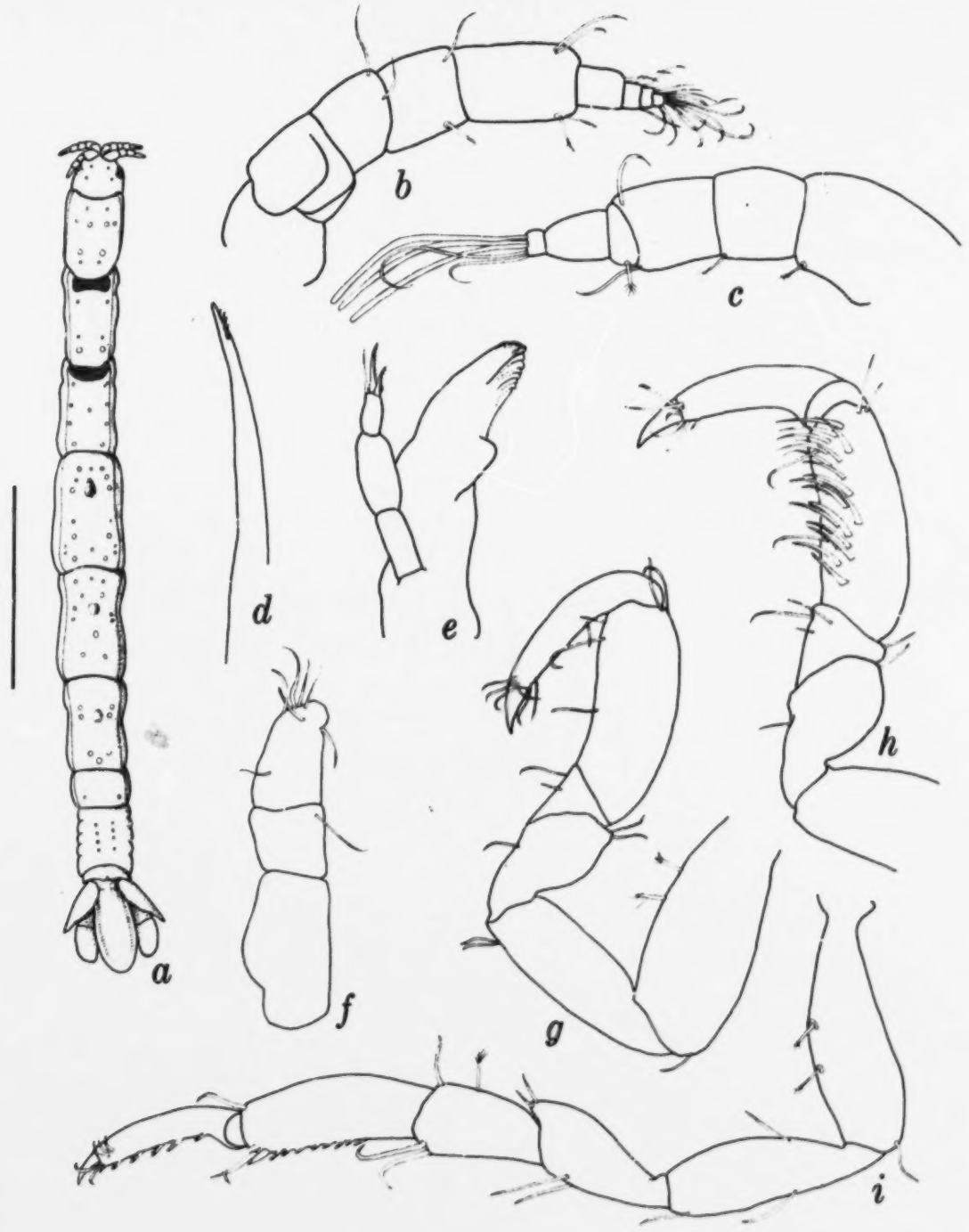

FIGURE 1.—*Cetanthura foveoderma*, new genus, new species: *a*, holotype in dorsal view; *b*, antenna; *c*, antennule; *d*, maxilla; *e*, mandible; *f*, maxilliped; *g*, pereopod 1, juvenile; *h*, pereopod 1 ♂; *i*, pereopod 7.

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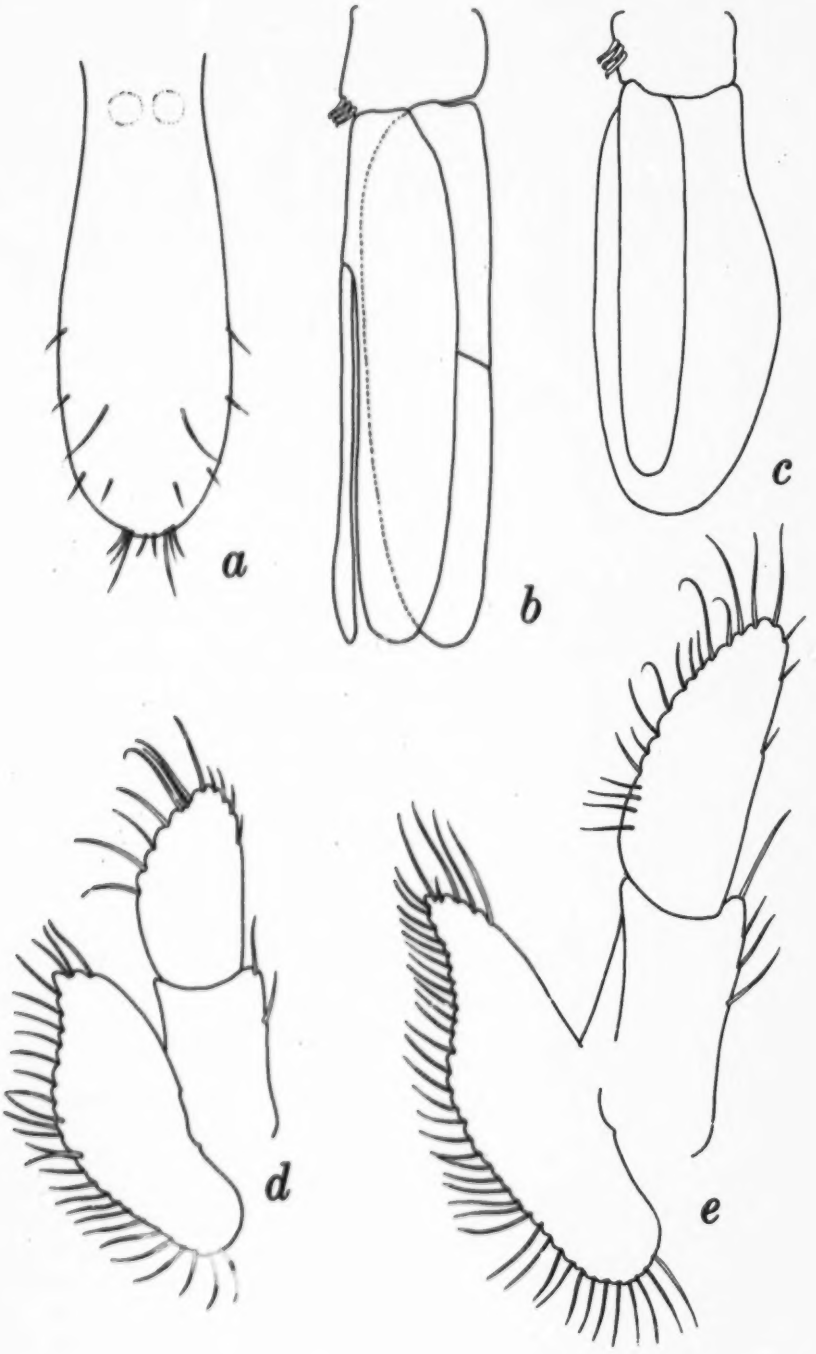

FIGURE 2.—*Cetanthura foveoderma*, new genus, new species: *a*, telson; *b*, pleopod 2♂; *c*, pleopod 1; *d*, uropod, juvenile; *e*, uropod ♂.

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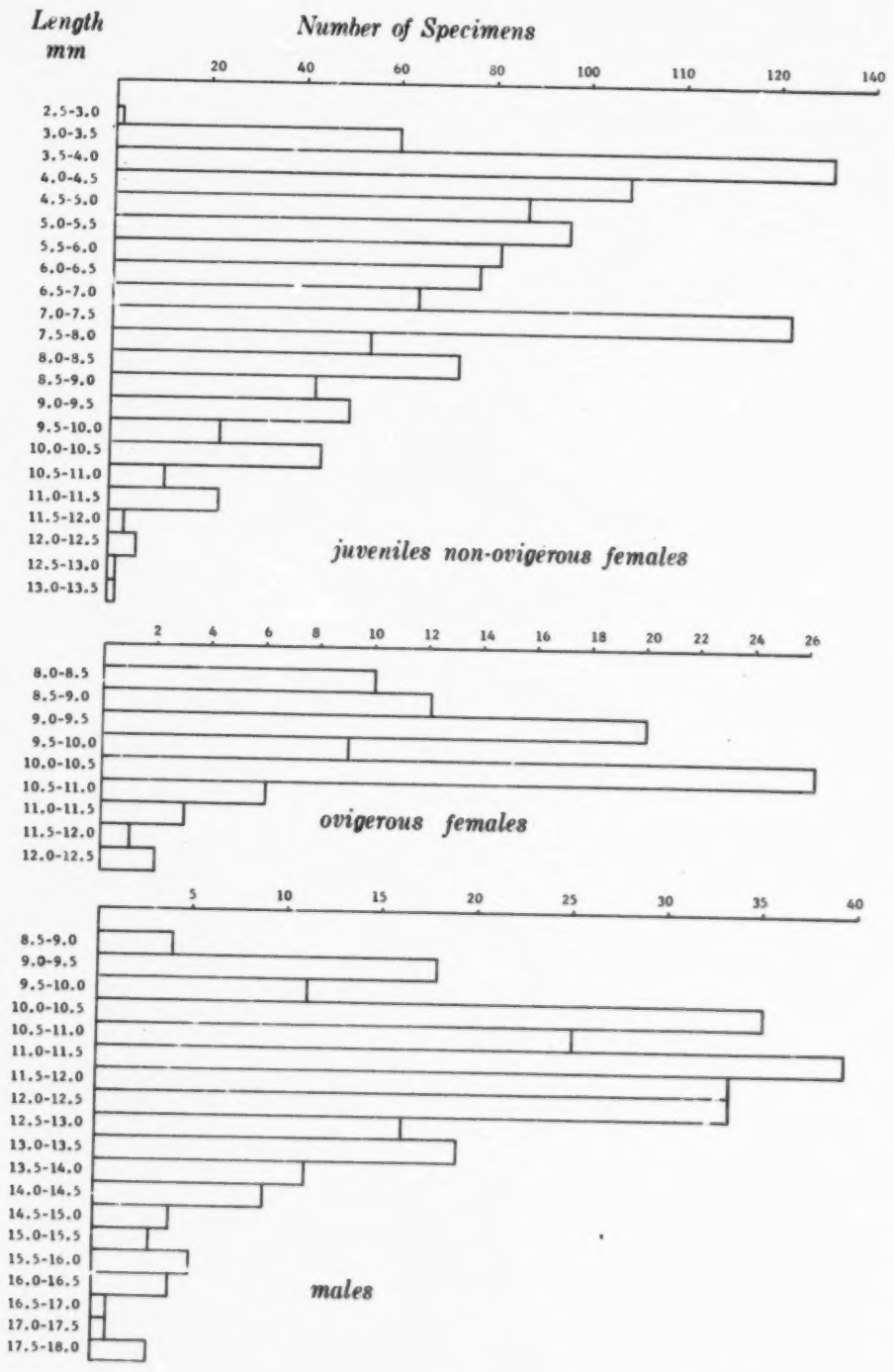

FIGURE 3.—*Cyathura profunda*, new species: total length distribution in 0.5 mm classes.

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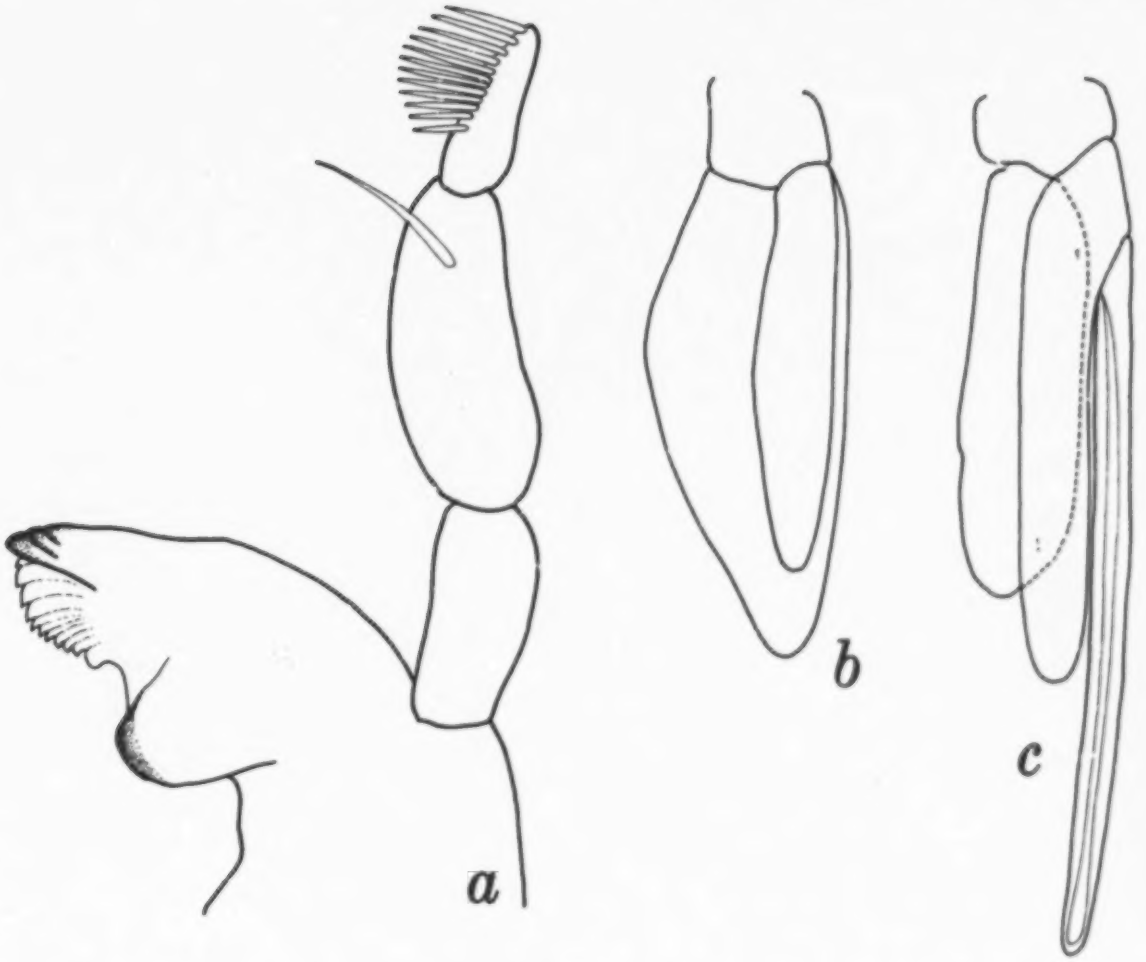

FIGURE 4.—*Cyathura profunda*, new species: *a*, mandible; *b*, pleopod 1; *c*, pleopod 2 ♂.

apex, with low rounded middorsal ridge becoming obsolete in distal third; proximolateral hollowed area adjoining pleonite 6; statocyst openings narrow, situated at base of middorsal ridge.

Antennule with basal segment subequal to three distal peduncular segments together; fourth segment very short; flagellum of three articles, two distal setose articles very small. Antenna with second peduncle segment grooved to accommodate antennule; flagellum of single short setose article. Mandibular palp 3-segmented, middle segment longest, distal segment bearing row of 12 fringed spines; molar low, bluntly rounded; incisor of three strong cusps; lamina dentata of 11 serrations. Maxilla of single large and six smaller spines. Maxilliped 4-segmented, fourth segment small, oval, set obliquely at distolateral corner of third segment, with four setae on medial margin; third segment with four short mediodistal setae; second and third segments subequal in length.

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Pereopod 1 subchelate, propodus expanded, palmar margin straight, with low rounded proximal convexity, with row of 11 or 12 simple setae; inner surface with 17 to 20 setae. Pereopods 2–7 essentially similar; propodi elongate-linear, carpi triangular, with very short anterior margin, underriding propodus. Marsupium of three pairs of oostegites on pereonites 3–5. Pleopod 1 exopod operculiform, indurate, with low rounded proximal ridge, tapering strongly in distal half; exopods of left and right side overlapping in midline, especially distally; endopod half width and about three-quarters length of exopod. Uropodal exopod reaching level of telsonic apex, broadly oval, distally subacute, outer margin faintly sinuous; basis almost reaching telsonic apex, parallel-sided in dorsal view, triquetrous with strong ventral ridge; endopod oval-rounded, extending beyond telsonic apex.

Male: Anterior body essentially similar to female; pleon relatively more elongate. Antennule with dense clusters of aesthetascs on third flagellar article. Pereopod 1 propodus with about 40 setae on inner surface. Pleopod 2 with copulatory stylet extending about half its length beyond endopod, distally evenly rounded.

Remarks.—The structure of the pleon and telson, cephalic, pereonal, and pleonal appendages, and especially the 4-segmented maxilliped and triangular carpus of the posterior pereopods, place this species in the genus *Cyathura*. Of the 21 species of *Cyathura* described, several are from freshwater in caves, a few are estuarine forms, while the majority are from intertidal-shallow infratidal habitats. None are known from such deep water as the present species.

Cyathura profunda with its heavy integumental sculpturing, bears little resemblance to any of the described species of *Cyathura*.

Etymology.—The specific name refers to the deep-abyssal habitat of the species.

Biology.—As the material of *C. profunda* comes from five closely situated stations in the Argentine Basin, and was collected within a short period, it is reasonable to combine these specimens and regard them as a large sample from a single population.

The total length of each of the 1576 specimens was measured to the nearest 0.5 mm, and the specimens sorted into males, females with marsupia, and juveniles/non-ovigerous females. Each of these groups is displayed in a graph (Figure 4), and along with the graph combining the three classes (Figure 5), allow some comments on the biology of *C. profunda* to be made.

Although ovigerous females and mature males overlap in total lengths, the species possibly exhibits protogynous hermaphroditism, as is the case for shallow water *Cyathura* species (Burbanck and Burbanck 1979; Legrand and Juchault 1961).

Although two peaks appear in the size-classes of the juveniles/nonovigerous females, and the ovigerous females show a peak at 10.0–10.5 mm, and males at 11.0–11.5 mm, it is difficult to predict the number of molts between manca in marsupium and adult male. Between manca length (2.5–3.0 mm) and smallest ovigerous female (8.0–8.5 mm), is an increase of 5.5 mm. Extrapolating from Burbanck and Burbanck's (1979) findings for *C. polita* (a species that reaches a greater total length than *C. profunda*, and that shows a length increase of about 1.0 mm per molt), this would imply about five or six molts to attain the ovigerous female size. Figure 5 shows that only males occur in the size range 13.5–18.0 mm. As 165 of the 269 males (61%) examined fall within the size range 10.0–12.5 mm, it is possible that there are further molts after the initial female-to-male molt. Another possibility is that the males represent a mixture of primary males plus "transformed" males.

Burbanck and Burbanck (1979) found females with marsupia in *C. polita* to range from 14–25 mm total length in Massachusetts; Kruczynski and Subrahmanyam (1978) report a range of 8.3–13.0 mm for the same species from Florida. *C. profunda* also shows a considerable range of total length of females with marsupia, viz. 8.0–12.5 mm. Little can be said for the present material

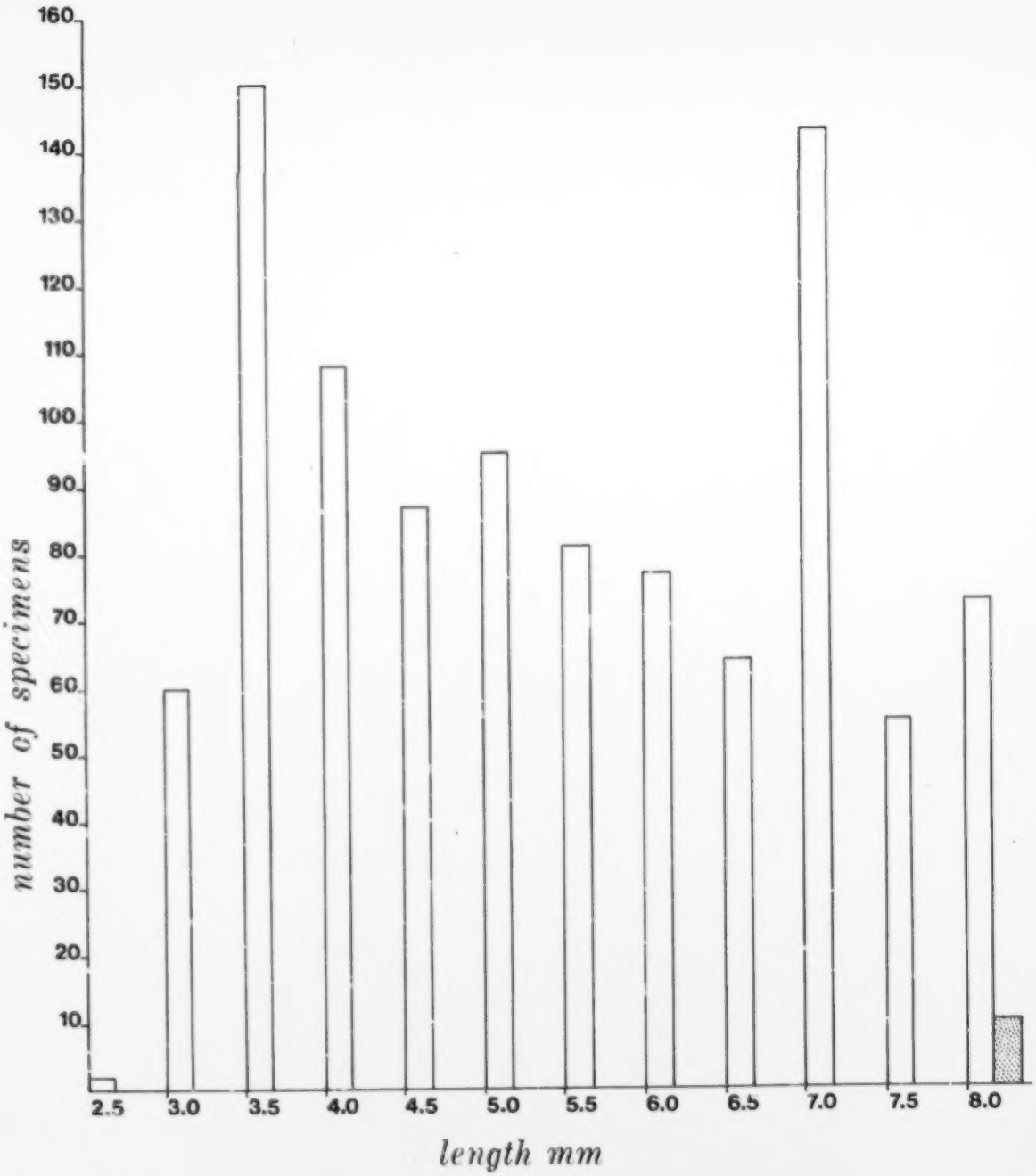

FIGURE 5.—*Cyathura profunda*, new species: total length distribution in 0.5 mm classes.

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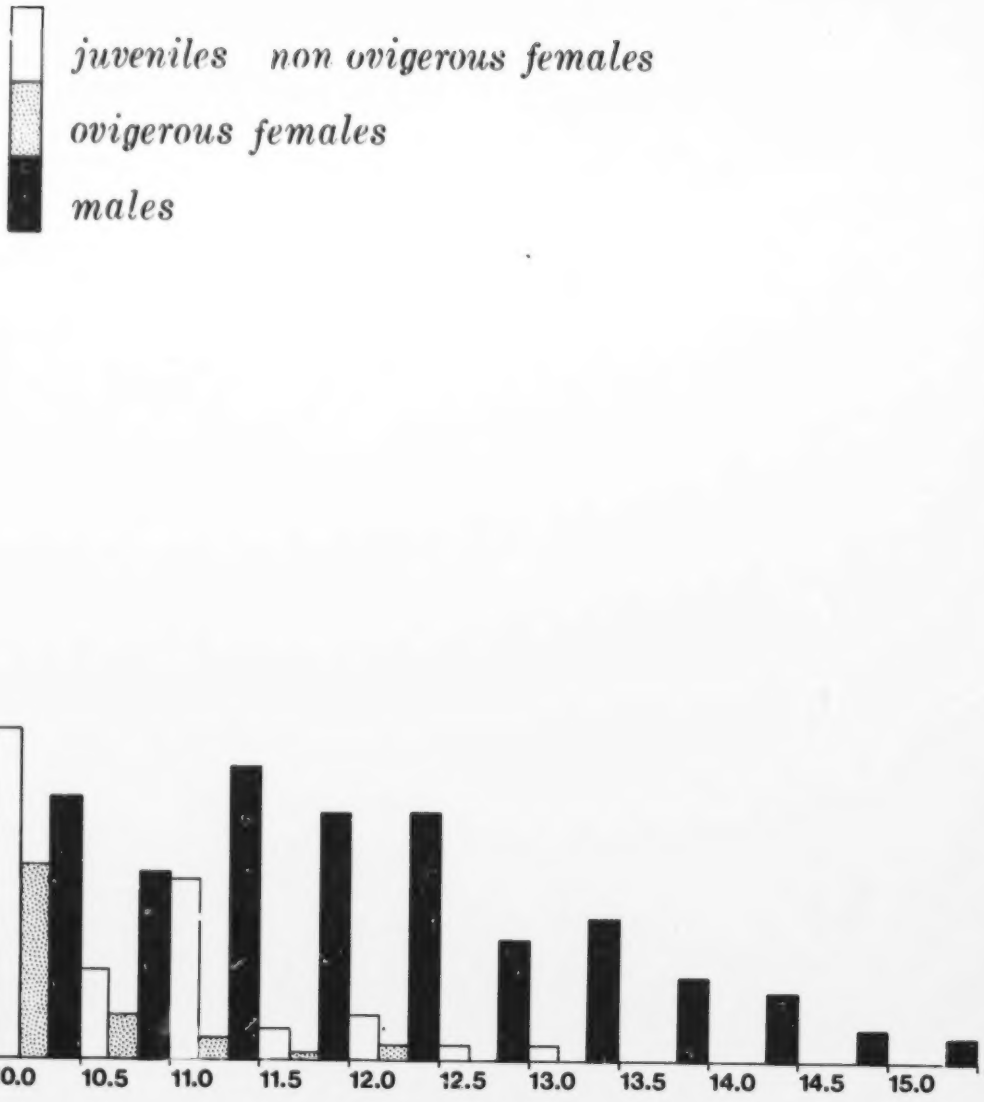

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concerning the numbers of eggs or manca in the marsupia, as some loss probably occurred in some cases during collection or sorting. The number of eggs or manca per individual marsupium shows the following distribution: number of eggs/marsupium: 1, 1, 3, 5, 6, 6, 6, 7, 7, 9, 10, 10, 11, 13, 14; number of manca/marsupium: 1, 2, 2, 3, 3, 3, 3, 4, 4, 4, 4, 7, 8, 8, 9, 9, 11.

Genus *Malacanthura*

Malacanthura Barnard, 1925:133.
Filanthura Wägele, 1980:180.

DIAGNOSIS.—Eyes present or absent. Antennular flagellum of 3–6 articles. Antennal flagellum of 4–7 articles. Mandible with 3-segmented palp; incisor, lamina dentata, and molar present. Maxilliped 5-segmented; endite small to rudimentary, or absent. Pereopod 1 subchelate, propodus expanded. Pereopods 2 and 3 smaller than 1, ambulatory. Pereopods 4–7 with rectangular carpus not underriding propodus. Pereonites 4–6 each with dorsal pit, usually situated in longitudinal slit-like depression. Pleopod 1 exopod operculiform. Pleonites 1–5 short, fused; pleonite 6 free. Telson with 2 basal statocysts.

REMARKS.—As Wägele (1980) points out, the type species of *Malacanthura*, *M. linguicauda* (Barnard, 1920) has never been illustrated in detail. As our understanding of the generic criteria in the Anthuridea has advanced since Barnard (1925), so a stricter definition of *Malacanthura*, based on the holotype of *M. linguicauda* (South African Museum cat. no. A4172, ♂ TL 11.0 mm) can be proposed. From the above diagnosis it is unnecessary to separate *M. caribbica* Paul and Menzies, 1971 (= *M. cumanensis* Paul and Menzies, 1971; see Kensley 1980a) into the genus *Filanthura*, as proposed by Wägele (1980). With Poore's careful definition of *Haliophasma* (1975), several species of this genus can now be placed in *Malacanthura*. Contrary to Wägele's statement (1980: 180) *M. mombasa* Kensley, *M. caribbica* Paul and Menzies, and the other species listed below, have all the diagnostic features in common. Only in the presence or absence of a maxillipedal endite is any variation seen. As this structure is usually very thin-walled and small, it may have been overlooked in some species. An endite is present in all three species dealt with below. Whether the width:length ratio (which is a variable depending on stage of development and maturity) can be regarded as an advanced feature and used in generic separation is questionable.

In addition to the three species described below, *Malacanthura* is now regarded as containing the following species: *M. caribbica* Paul and Menzies, *M. coronicauda* (Barnard), *M. foveolata* (Barnard), *M. hermani* (Barnard), *M. linguicauda* (Barnard), *M. mombasa* Kensley, *M. ornata* (Barnard), and *M. pseudocarinata* (Barnard).

Malacanthura antarctica, new species

FIGURES 6, 7

MATERIAL.—Holotype: USNM 185000, Sta WHOI Rankin 0006, 1 non-ovig. ♀, 27.6 mm. Paratypes: USNM 185001, Sta WHOI Rankin 0004, 1 non-ovig. ♀, 17.0 mm; USNM 185002, Sta WHOI Rankin 0011, 1 non-ovig. ♀, 25.0 mm.

DESCRIPTION.—*Non-ovigerous Female:* Integument indurate, with numerous small scattered pits on cephalon, antennal bases, dorsal and ventral pereon, pleon, pereopod 1, pleopod 1 exopod, uropod, and telson. Body proportions: C < 1 = 2 = 3 < 4 < 5 > 6 > 7. Cephalon with low rounded rostrum. Eyes weakly pigmented, ocelli not demarked. Pereonites 4–6 each with elongate middorsal pit. Pleonites 1–5 fused, lines of fusion marked by short epimera and shallow grooves. Pleonite 6 free, lacking free lateral margins. Telson with 2 basal statocysts; widest in distal half, apex broadly rounded; with rounded middorsal and submedian longitudinal ridges.

Antennule with basal segment broader and longer than 2 distal peduncle segments; flagellum of four articles, three distal articles tiny, setose, with two aesthetascs. Antenna with second peduncle segment grooved to accommodate anten-

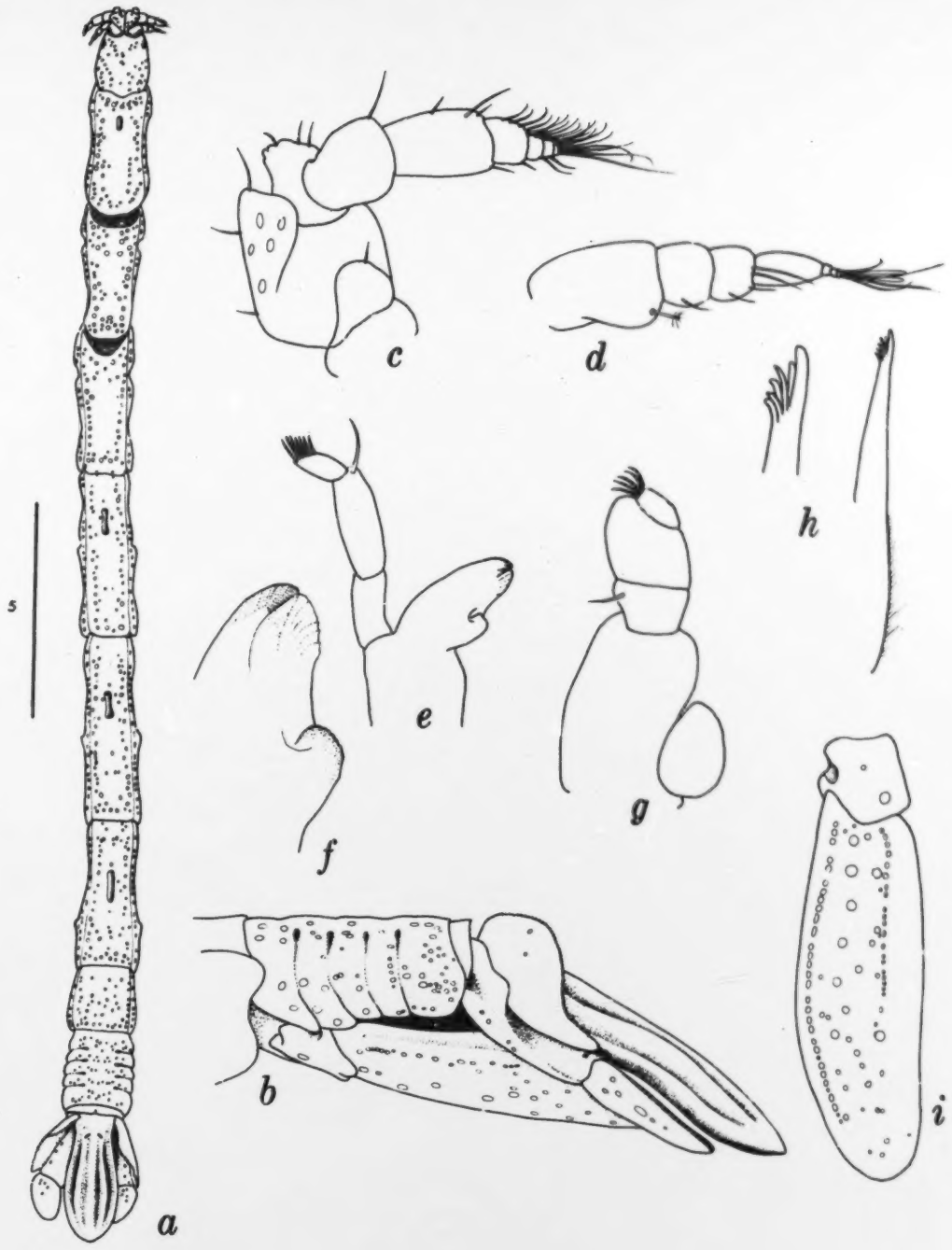

FIGURE 6.—*Malacanthura antarctica*, new species: *a*, holotype in dorsal view; *b*, pleon in lateral view; *c*, antenna; *d*, antennule; *e*, mandible; *f*, mandible, incisor, lamina dentata, and molar enlarged; *g*, maxilliped; *h*, maxilla; *i*, pleopod 1 exopod.

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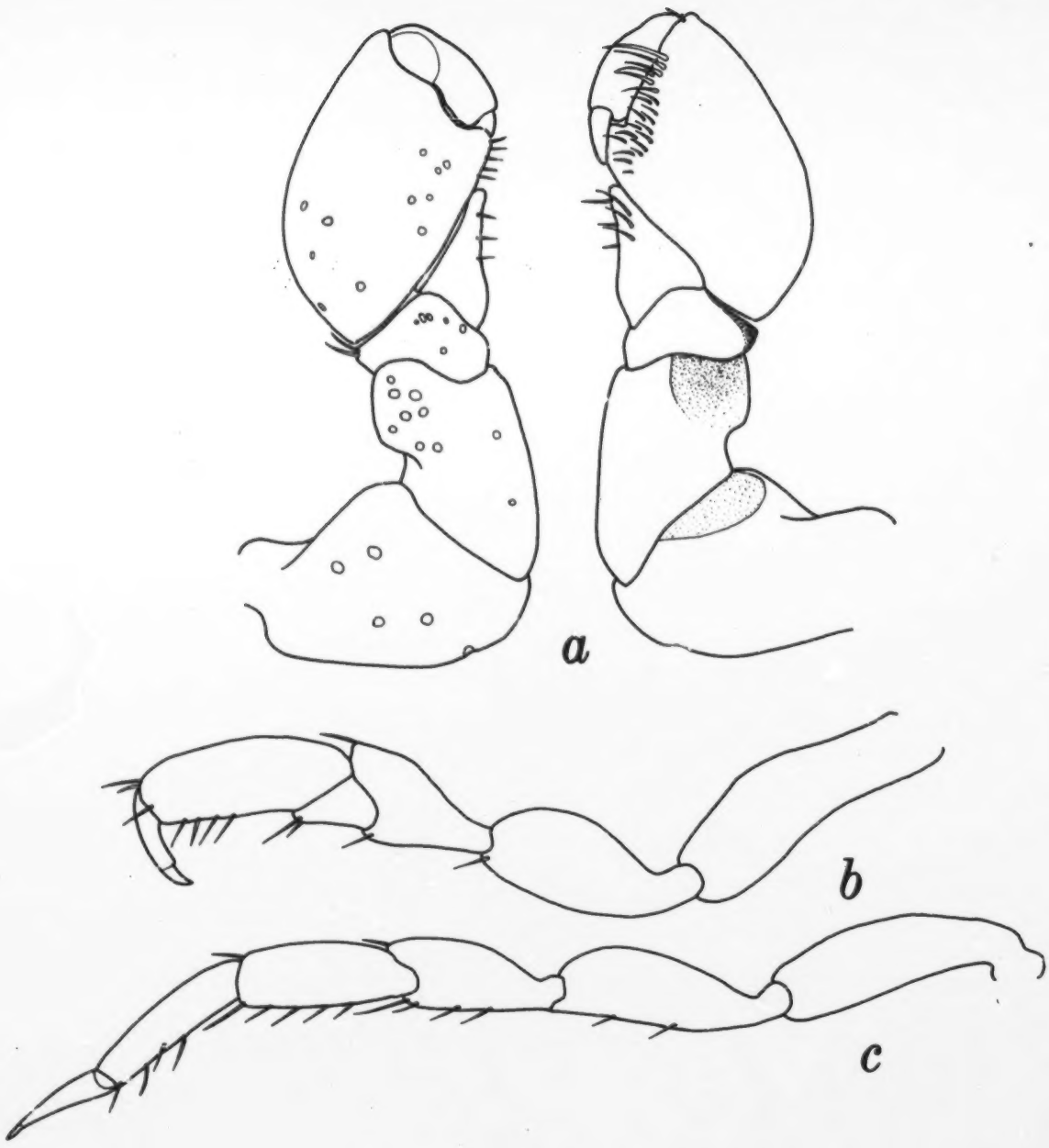

FIGURE 7.—*Malacanthura antarctica*, new species: *a*, pereopod 1, inner and outer view; *b*, pereopod 2; *c*, pereopod 7.

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nule, dorsal flange of groove pitted; third segment with low tubercle-bearing crest; flagellum of five setose articles. Mandibular palp 3-segmented, terminal segment half length of segment 2, with six distal setae; incisor of single stout sclerotised cusp; lamina dentata with marginal serrations faint; molar low, rounded, non-sclerotised. Maxilla with six distal spines. Maxilliped 5-segmented, segment 2 longer than three distal segments together; terminal segment set obliquely on outer distal angle of segment 4, bearing five setae. Pereopod 1 robust; propodus expanded; outer surface of propodus, merus, ischium, and basis pitted; unguis one-third length of dactylus; propodal palm with low, rounded, proximal lobe, inner palmar surface with numerous setae; carpus narrowly triangular, distally setose. Pereopod 2 much less robust than pereopod 1, propodus rectangular-linear; carpus triangular. Pereopods 4–7, propodi and carpi rectangular-linear. Pleopod 1 exopod operculiform, indurate, pitted; endopod about one-third width and three-quarters length of exopod. Uropodal basis triquetrous, ventral surface pitted; endopod ovate, not reaching telsonic apex; exopod just reaching endopod base, outer margin sinuous, apex narrowly rounded.

REMARKS.—This is the first species of *Malacanthura* recorded from the Antarctic. Of the six southern African species, *M. coronicauda* (Barnard) and *M. foveolata* (Barnard) have tricarinate telsons, but neither is as pitted as *M. antarctica*. *M. caribbica* Paul and Menzies, and *M. mombasa* Kensley both have unpitted integuments.

ETYMOLOGY.—The species was collected in the Weddell Sea, off the Antarctic continent, hence the specific name.

Malacanthura cantabrica, new species

FIGURES 8, 11

MATERIAL.—Holotype: USNM 185003, Sta WHOI Allen 44, 1 non-ovig. ♀, 11.0 mm. Paratypes: USNM 185004, Sta WHOI Allen 44, 1 non-ovig. ♀, 7.9 mm, 2 manca, 6.5 mm; ZMC, Sta WHOI Allen 44, 1 non-ovig. ♀, 8.9 mm.

DESCRIPTION.—*Non-ovigerous Female:* Integument moderately indurate, lacking pits. Body proportions: C < 1 < 2 = 3 < 4 < 5 > 6 > 7. Cephalon with low triangular rostrum; eyes lacking. Pereonites 4–6 each with large circular middorsal pit. Pleonites 1–5 fused, fused segments indicated laterally by short epimera, and shallow grooves over dorsum; pleonite 6 free, with middorsal slit in posterior margin. Telson with pair of proximal statocysts, with barely discernible rounded middorsal ridge; distal margin evenly rounded.

Basal antennular peduncle segment equal in length to these distal segments; flagellum of two articles, terminal article very short. Antennal flagellum of five articles, first article equal in length to four distal articles together. Terminal segment of 3-segmented mandibular palp shorter than segment 1, with three distal fringed spines; incisor of three cusps; lamina dentata with six serrations; molar bluntly rounded. Maxilla with eight distal spines. Maxilliped 5-segmented, terminal segment semicircular, with five setae; very reduced endite bearing single setae. Pereopod 1 unguis about one-sixth length of dactylus; propodus expanded, palm straight, with five short simple setae. Pereopods 2–4 ambulatory, propodi not expanded, with fringed sensory spine posterodistally, and numerous fine setules on posterior margin; carpi triangular, with posterodistal fringed spine. Pereopods 4–7 dactyli with fringed scales on anterior and posterior margins; propodi with fringed scales and posterodistal sensory spine on posterior margin; carpi rectangular, with anterior margin only slightly shorter than posterior. Pleopod 1 exopod operculiform, endopod less than half greatest width and about three-quarters length of exopod. Uropodal exopod oval, distally rounded, reaching slightly beyond basis, margin setose; endopod oval in outline, distally rounded, extending slightly beyond telsonic apex; basis with mediodistal corner acute, slightly produced.

REMARKS.—*M. cantabrica* most resembles that

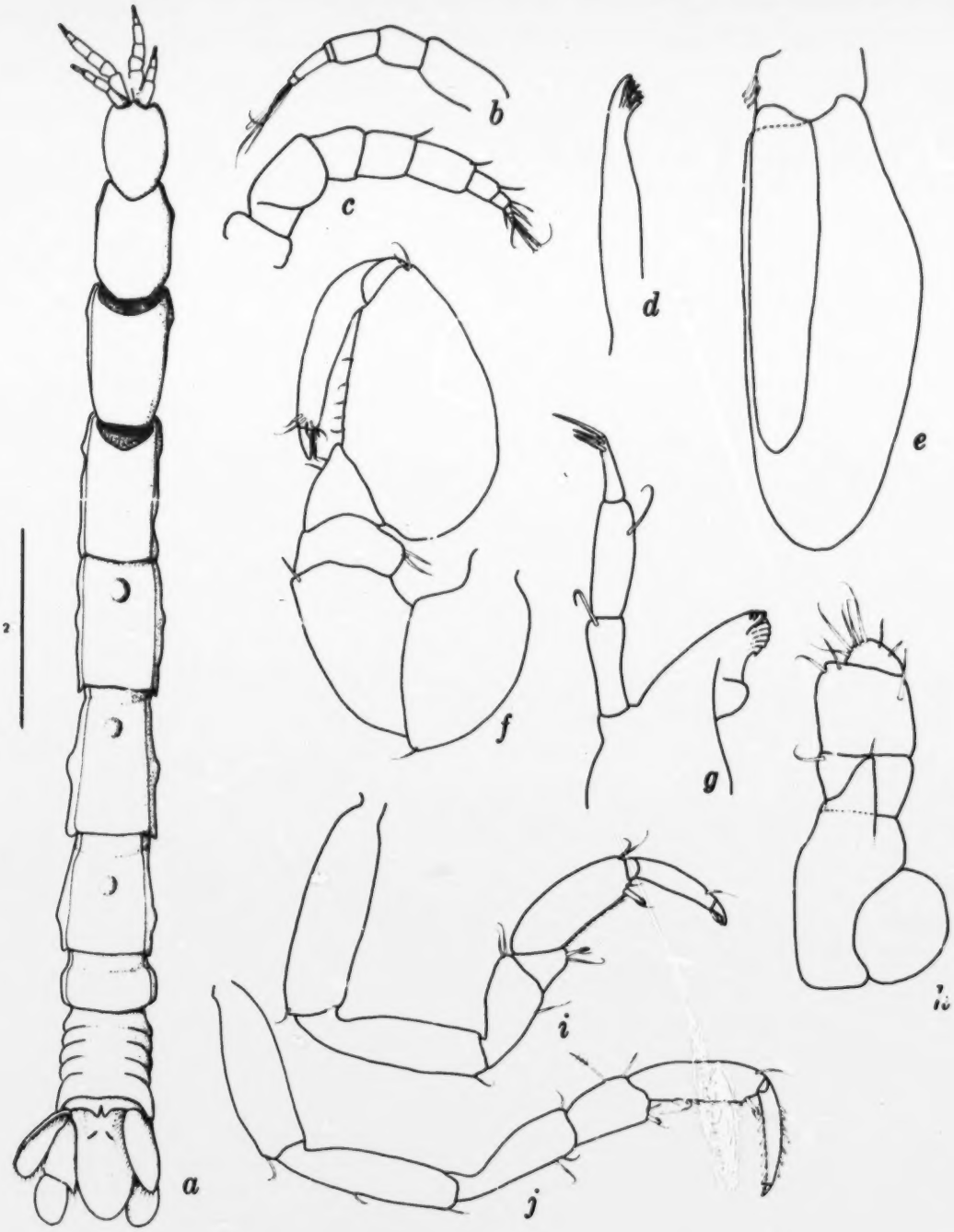

FIGURE 8.—*Malacanthura cantabrica*, new species: *a*, holotype in dorsal view; *b*, antennule; *c*, antenna; *d*, maxilla; *e*, pleopod 1; *f*, pereopod 1; *g*, mandible; *h*, maxilliped; *i*, pereopod 2; *j*, pereopod 7.

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group of shallow-water species having a relatively unsclerotised integument lacking scattered pits. This group includes *M. linguicauda* (Barnard) from South Africa, which differs from the present species in having a sinuate uropodal exopod, a notched palm of pereopod 1, and eyes; *M. mombasa* Kensley from the Indian Ocean, which possesses eyes, a strongly ridged telson, and a sinuate uropodal exopod; *M. hermani* (Barnard) from South Africa, which has a broad distally rounded telson with a strong mediolongitudinal ridge; *M. coronicauda* (Barnard) from South Africa, which has a tricarinate telson; and *M. caribbica* Paul and Menzies, from the Caribbean and Colombia, which has a strongly carinate telson and serrate uropodal rami.

ETYMOLOGY.—The specific name is derived from the Latin name for the Bay of Biscay, Mare Cantabricum.

Malacanthura truncata (Hansen)

FIGURES 9–11

Cyathura truncata Hansen, 1916:182, pl. 15: fig 2.
Anthelura truncata.—Barnard, 1925:135.—Menzies, 1962:192, fig. 72a.

MATERIAL.—USNM 185005, Sta WHOI 297, 1 non-ovig. ♀, 10.0 mm; USNM 185006, Sta WHOI 142, 1 non-ovig. ♀, 9.0 mm, 1 juv, 4.2 mm; USNM 185007, Sta WHOI CH35 Dr33, 1 non-ovig. ♀, 10.6 mm; SIO: Sta Allen 44, 2 non-ovig. ♀, 9.0 mm, 6.9 mm; Sta Allen 6697, 1 non-ovig. ♀, 8.0 mm.

DESCRIPTION.—*Non-ovigerous Female:* Integument moderately indurate. Body proportions: C < 1 < 2 > 3 > 4 = 5 > 6 > 7. Eyes absent. Cephalon and pereonites 1–2 with rounded lateral ridges; pereonites 4–6 each with middorsal circular depressed area. Pleonites 1–5 fused, segments indicated laterally by short epimera; pleonite 6 free, with middorsal notch in posterior margin. Telson widest at midlength, distally truncate, middorsally with low rounded ridge, becoming obsolete distally.

Antennule with 2-articulate flagellum, terminal article tiny, bearing three aesthetascs. Antenna with second segment grooved to accommodate antennule; flagellum of seven setose articles. Mandibular palp 3-segmented, second segment longest; third segment with seven distal spines; incisor with four cusps; lamina dentata with five marginal serrations; molar low, rounded. Maxilla with single strong terminal and six small, subterminal spines. Maxilliped 5 segmented, terminal segment with five simple setae; thin-walled endite reaching base of fourth segment. Pereopod 1 much more robust than following legs; unguis about half length of dactylus; propodus inflated, palm with low, rounded, proximal lobe, bearing scales; carpus triangular, distally rounded, bearing scales. Pereopod 2 propodus hardly inflated, with row of setae on posterior margin. Pereopods 5–7 with rectangular carpus not underriding propodus. Pleopod 1 exopod operculiform; endopod three-quarters length and less than half width of exopod. Uropodal exopod elongate, apically acute, outer margin sinuate, setose, serrate; endopod oval, not reaching telsonic apex, bearing several marginal setae.

REMARKS.—Although Barnard (1925) placed Hansen's species in *Anthelura*, examination of the type-species, *A. elongata* Norman and Stebbing, has led to a diagnosis that must exclude *A. truncata* (see Kensley 1978b:787). *M. truncata* resembles the type-species of *Malacanthura*, *M. linguicauda* (Barnard) in having an unsculptured integument, but differs in the absence of eyes, and in the presence of a maxillipedal endite. The former feature is probably related to the deepwater habitat. Hansen does not figure a maxillipedal endite, while Barnard (1925) states it is absent. Considering how very thin-walled this structure is, it is not surprising that it was overlooked. Hansen's figures, however, agree with the present material, not just in the overall shape and proportions of the appendages, but also in fine details such as the serrations on the dactylus of pereopod 1, the setation of the maxilliped, the uropodal marginal serrations, and the mandibular palp spination. These similarities, together with the very distinc-

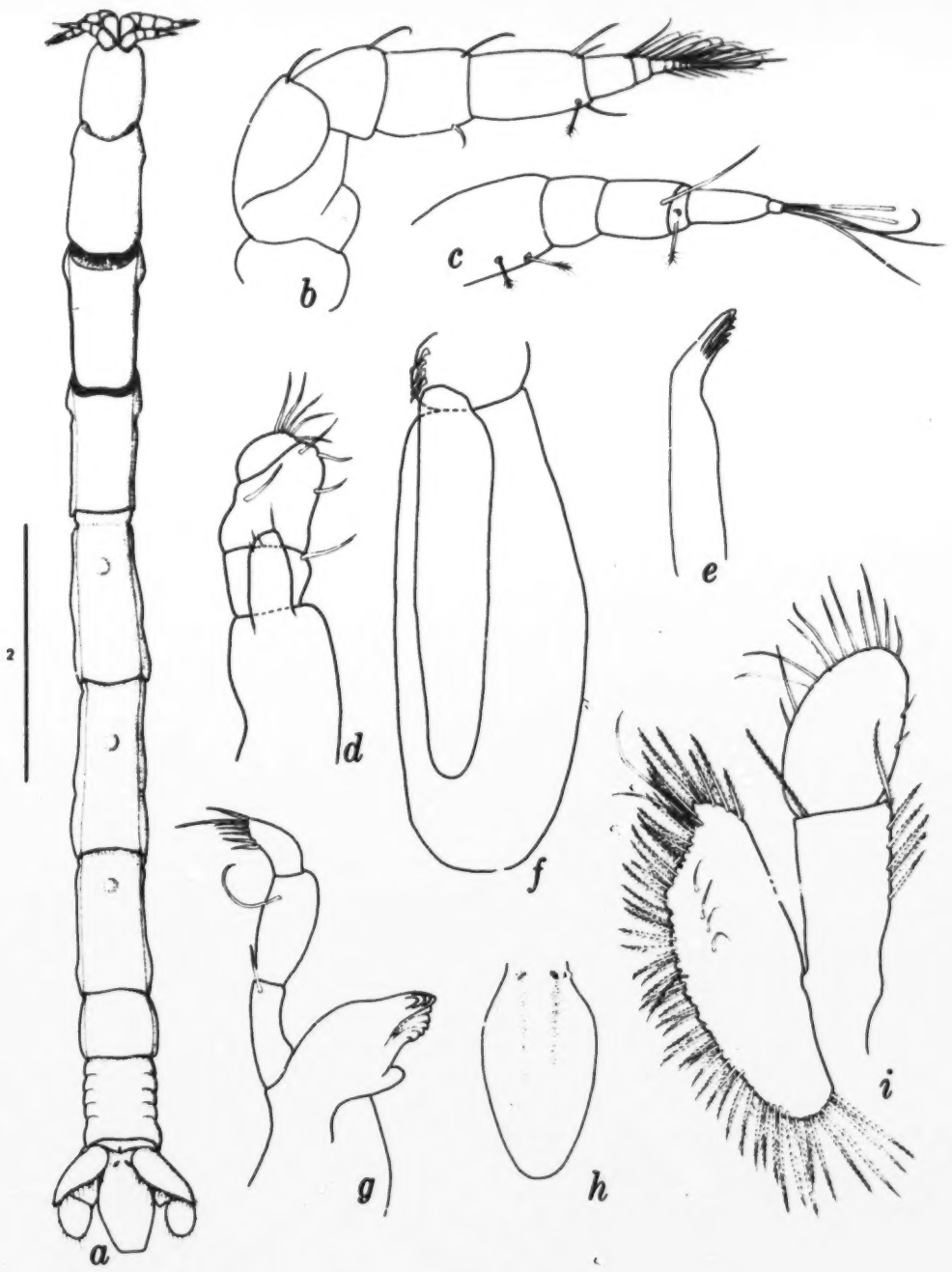

FIGURE 9.—*Malacanthura truncata* (Hansen): *a*, female in dorsal view; *b*, antenna; *c*, antennule; *d*, maxilliped; *e*, maxilla; *f*, pleopod 1; *g*, mandible; *h*, telson; *i*, uropod.

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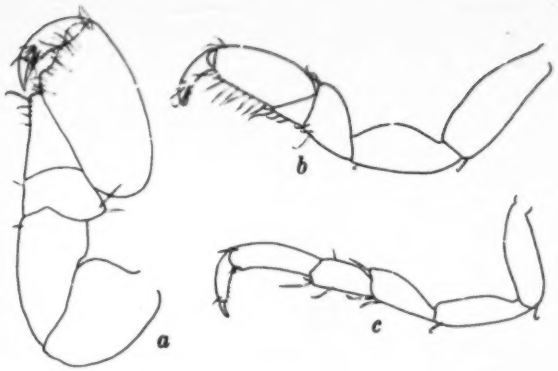
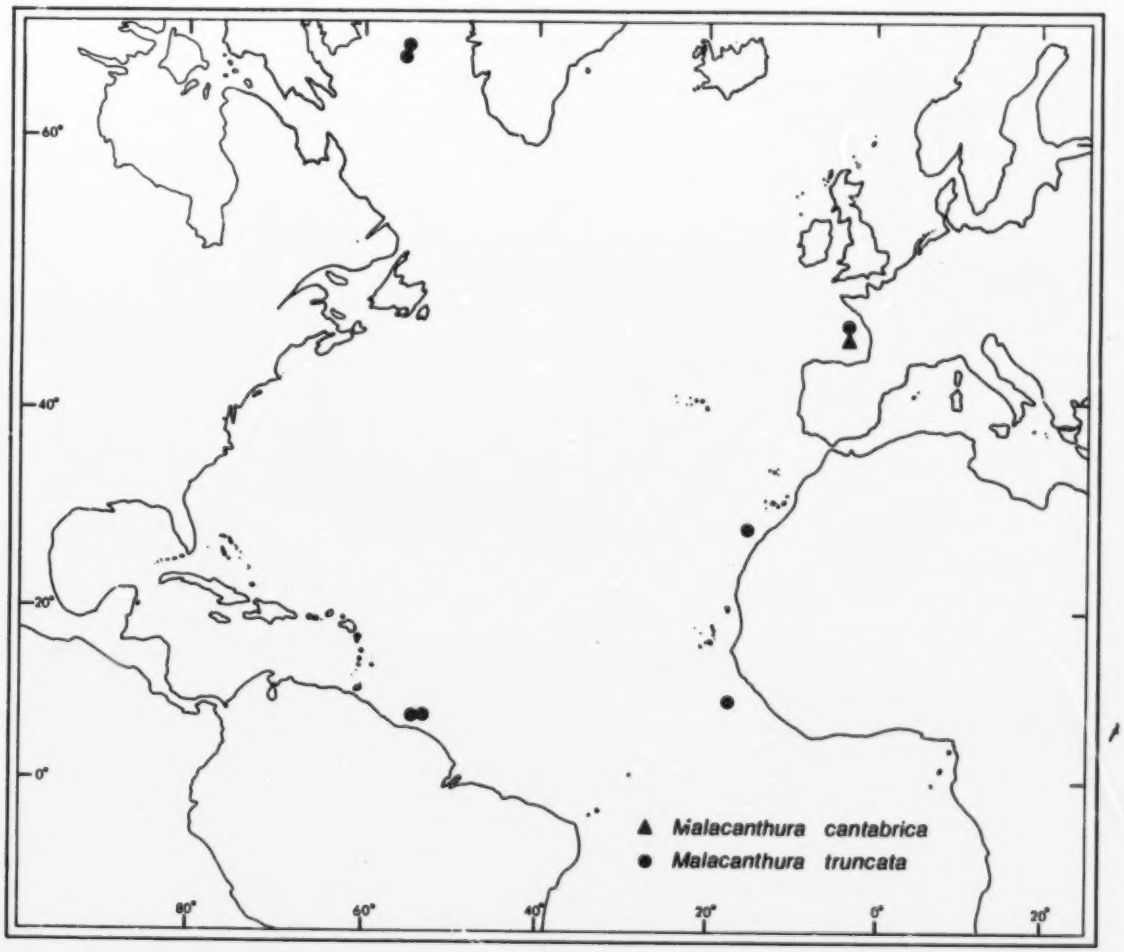


FIGURE 10.—*Malacanthura truncata* (Hansen): *a*, pereopod 1; *b*, pereopod 2; *c*, pereopod 7.

FIGURE 11.—Distribution of *Malacanthura cantabrica* and *Malacanthura truncata*.



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tive telsonic shape, leave no doubt as to the identity of the present material. The shape of the truncate telson, and the elongate-serrate uropodal exopod easily separate this species from *M. cantabrica* described above.

The material from the two Allen stations, i.e., the Bay of Biscay and the Canary Islands, is included in this species as it agrees in the structure of the appendages and body proportions. The only difference is in the shape of the telson, which is not distally broadly truncate, but broadly rounded (Figure 9h). As telsonic shape is usually a constant and reliable character, the inclusion of this material is somewhat tentative.

PREVIOUS RECORDS.—Davis Strait, 2400–2870 m.

Genus *Ocsanthura*

Oscanthura gracilis, new species

FIGURES 12–14

MATERIAL.—Holotype: USNM 185010, Sta WHOI BER.2, 1 juv, 8.3 mm. Paratypes: ZMC, Sta WHOI BER.2, 1 juv, 5.0 mm; Sta WHOI BER.3, 1 juv, 7.0 mm; USNM 185013, Sta WHOI BER.4, 8 juvs, 5.0 mm; USNM 185014, Sta WHOI BER.6, 1 juv, 5.0 mm.

DESCRIPTION.—*Juvenile:* Body slender, elongate; integument not indurate. Body proportions: C < 1 < 2 = 3 < 4 = 5 > 6 > 7. Cephalon with very low rostrum, eyes lacking. Pleonites 1–6 free, subequal in length and width; pleonite 6 with convex posterior margin. Telson with two basal statocysts; narrow, parallel-sided for three-quarters length, distal quarter with few small marginal serrations, tapering abruptly to narrowly rounded apex bearing six elongate simple setae.

Antennular peduncle with basal segment much broader than, and subequal in length to three distal segments; flagellum of three articles. Second antennal peduncle segment broadest, grooved to accommodate antennule; flagellum of eight articles. Mandibular palp 3-segmented, second segment longest, bearing single elongate seta; terminal segment with three distal setae. Incisor of three cusps; lamina dentata of four serrations followed by low finely spinulose convexity; molar short, rounded. Maxilla with one strong and six more slender subterminal spines. Maxilliped 7-segmented, second segment longest; terminal segment tiny, bearing four setae; endite broad, distally rounded, almost reaching distal margin of fifth palp segment. Pereopods 1–3 similar, subchelate; pereopod 1 unguis one-third length of dactylus; propodus proximally slightly expanded, palm bearing four short fringed spines and delicate, rounded, fringed scales; carpus triangular, with four fringed spines and several fringed scales on posterior margin. Pereopod 2 unguis one-quarter length of dactylus; propodus slightly more expanded than in pereopod 1, palm with fringed scales and four short bipartite spines; carpus triangular, distally acute, with two terminal fringed spines. Pereopods 4–7 unguis one-eighth length of dactylus; propodus with posterodistal sensory spine; carpus broad, posterior margin longer than anterior margin, not underriding propodus, with two sensory spines and few setae on posterior margin. Pleopod 1 not operculiform, similar to following pleopods; endopod longer than exopod, both rami with plumose setae; basis with three retinaculae. Uropodal exopod elongate-oval, reaching telsonic apex, with distal simple setae; endopod elongate-oval, with distal simple setae; basis short.

REMARKS.—The present species agrees with all the diagnostic criteria given by Kensley (1978a) for the genus *Ocsanthura*. *Ocsanthura gracilis* differs from *O. vimsae* in having a less-developed but still bipartite lamina dentata, and a more rounded molar of the mandible, a longer and broader maxillipedal endite, and narrower and more elongate uropods and telson. Apart from differences in the spinal and setal armature, the pereopods are very similar in the two species.

ETYMOLOGY.—The specific name refers to the slender nature of the body and especially of the uropods and telson.

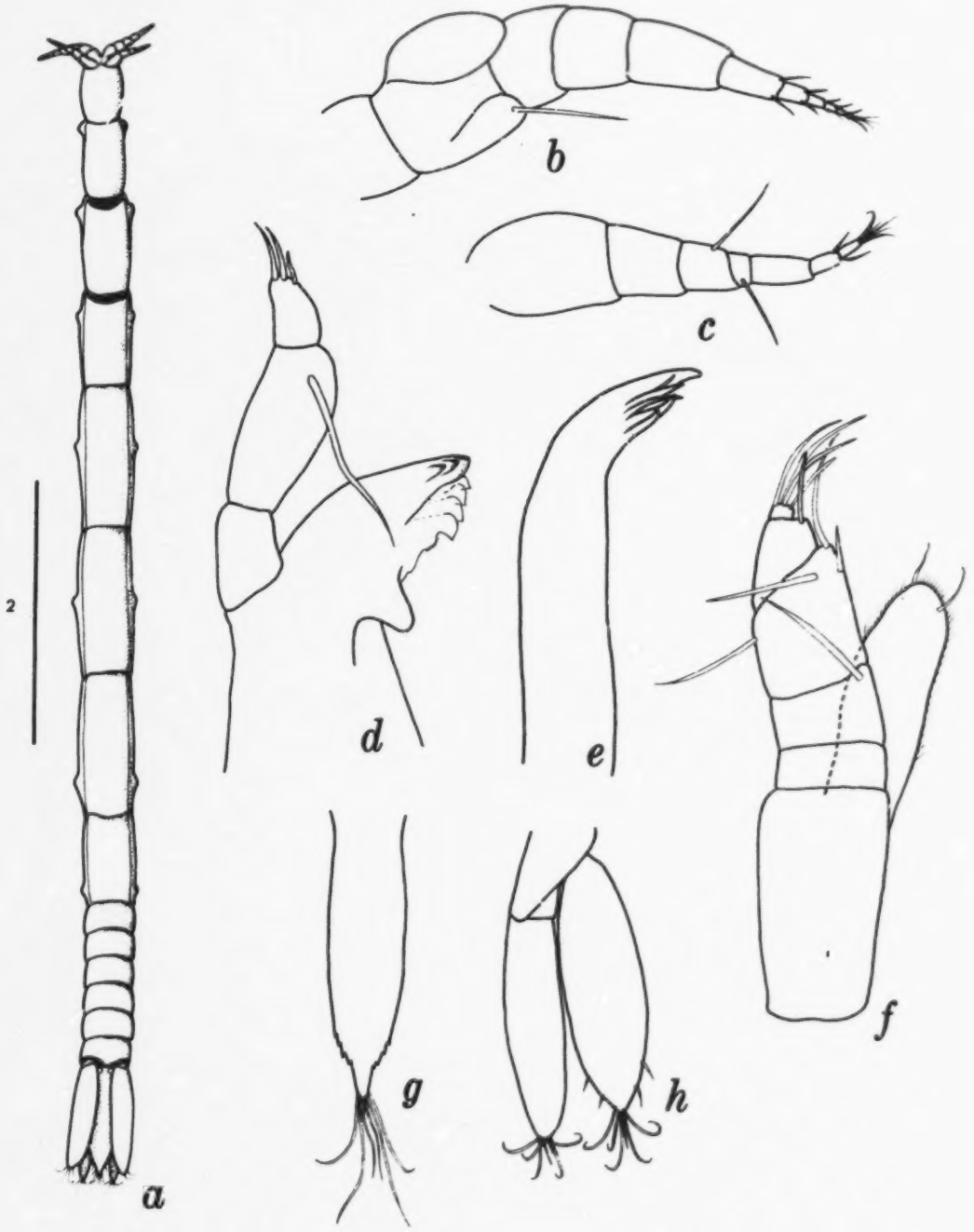

FIGURE 12.—*Ocsanthura gracilis*, new species: *a*, holotype in dorsal view; *b*, antenna; *c*, antennule; *d*, mandible; *e*, maxilla; *f*, maxilliped; *g*, telson; *h*, uropod.

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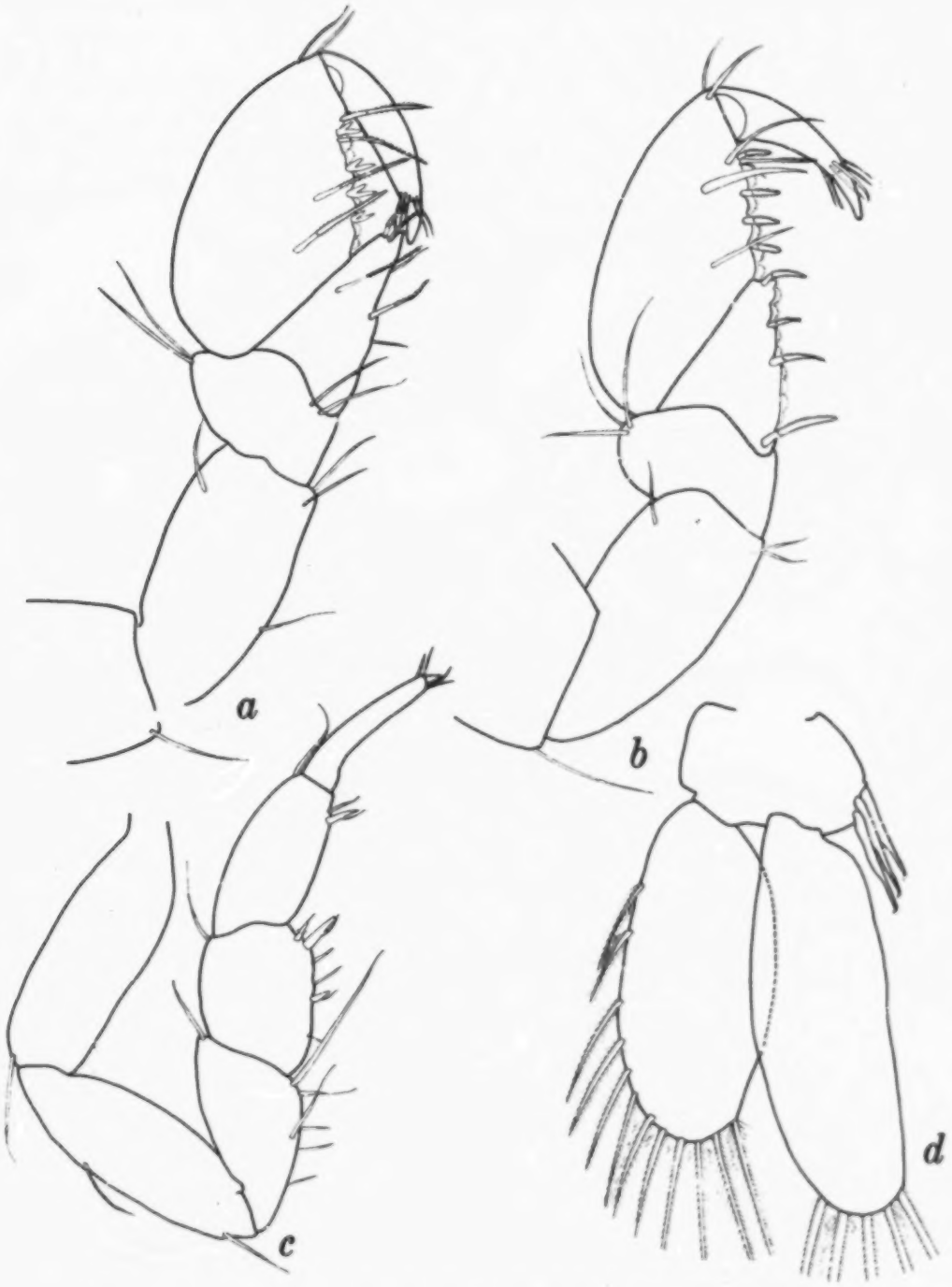

FIGURE 13.—*Ocsanthura gracilis*, new species; *a*, pereopod 2; *b*, pereopod 1; *c*, pereopod 7; *d*, pleopod 1.

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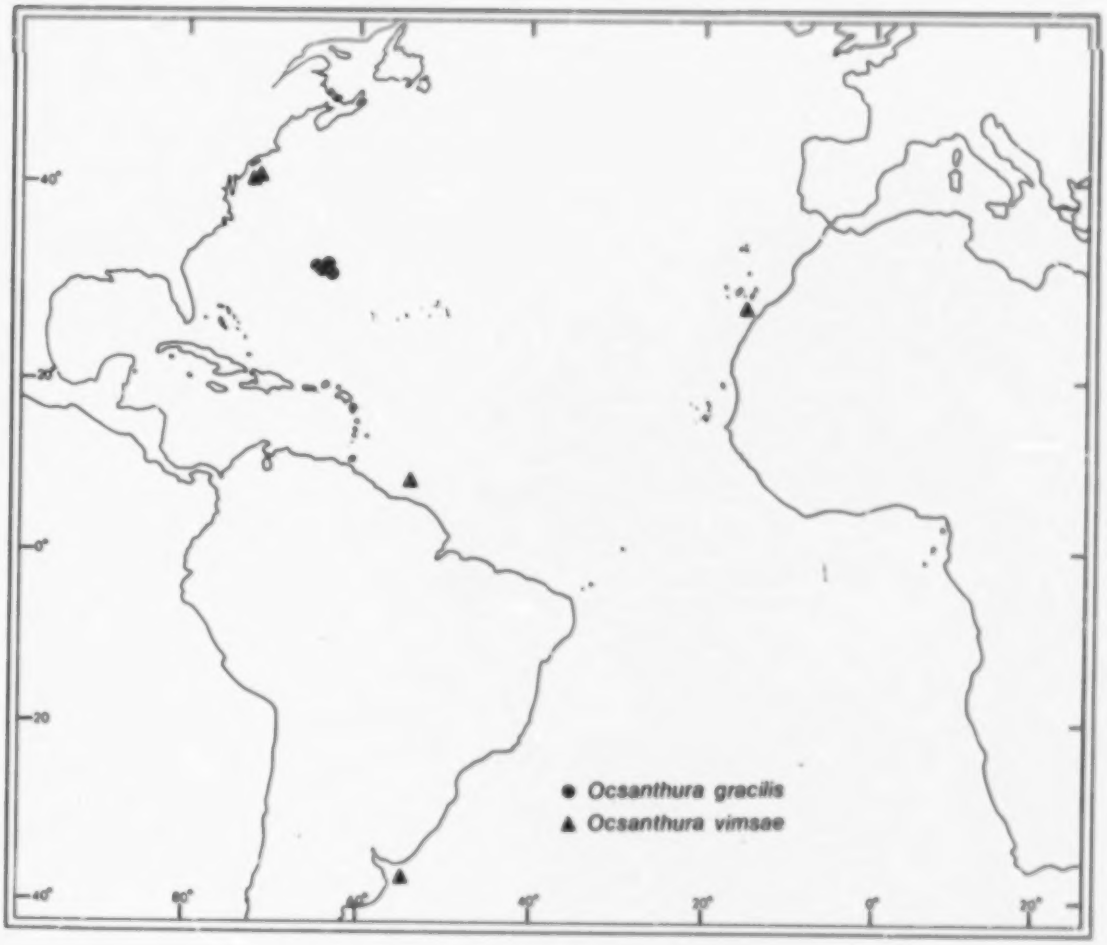

FIGURE 14.—Distribution of *Ocsanthura gracilis* and *Ocsanthura vimsae*.

Ocsanthura vimsae Kensley

FIGURE 14

Ocsanthura vimsae Kensley, 1978a:550, figs. 1, 2.

MATERIAL.—SIO: Sta WHOI 237, 1 manca, 5.0 mm; Sta WHOI 297, 1 manca, 4.4 mm; Sta WHOI Allen 6701, 1 juv, 7.2 mm.

PREVIOUS RECORDS.—Off New Jersey and Virginia, USA, 350–460 m.

Genus *Quantanthura*

Quantanthura sinuata, new species

FIGURES 15–16

MATERIAL.—Holotype: USNM 185015, Sta WHOI Ch35 DR33, 1 juv, 10.1 mm.

DESCRIPTION.—*Juvenile:* Integument moderately indurate. Body proportions: C < 1 = 2 = 3 < 4 = 5 > 6 > 7. Anterolateral corners of

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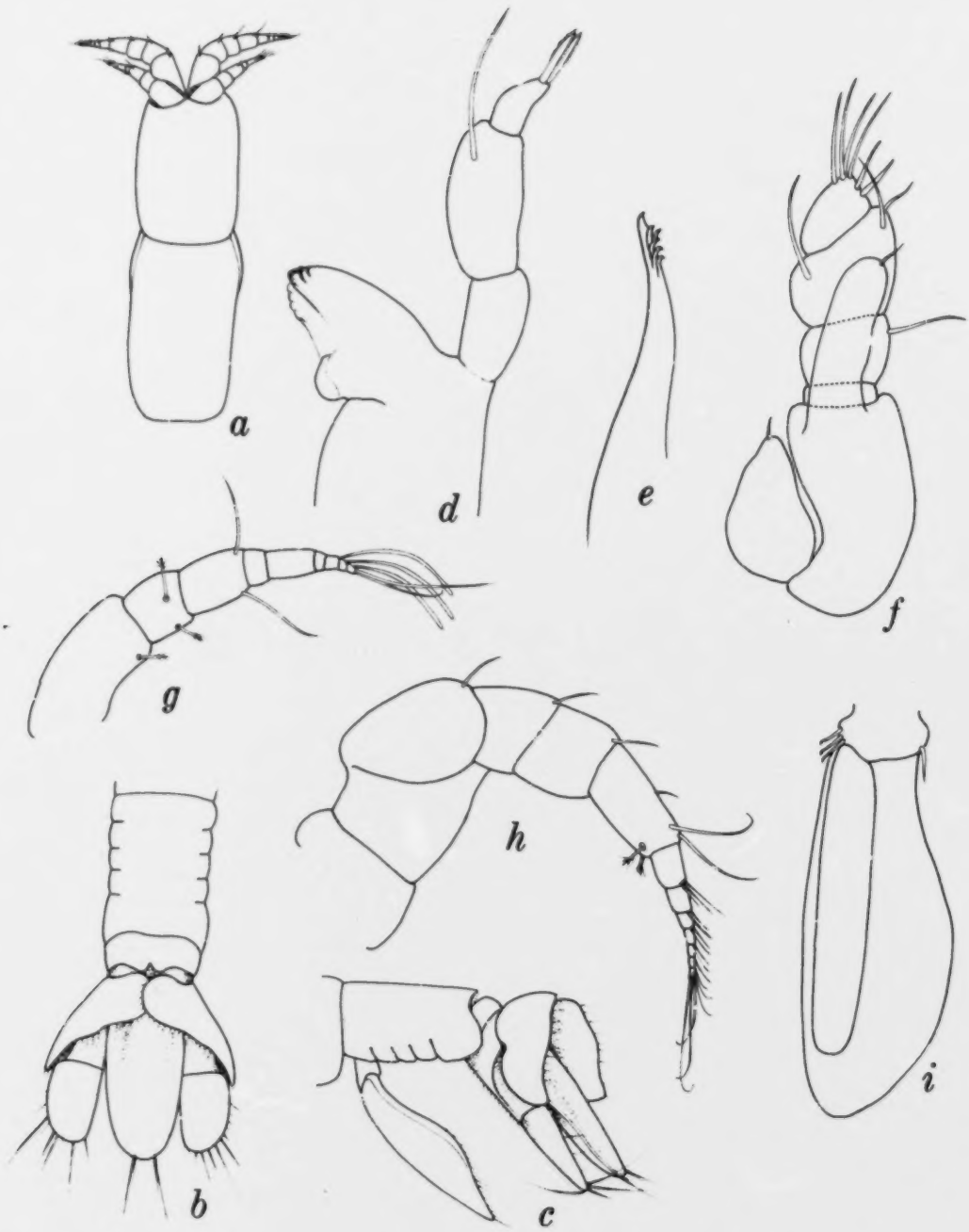

FIGURE 15.—*Quantanthura sinuata*, new species: *a*, cephalon and pereonite 1; *b*, pleon in dorsal view; *c*, pleon in lateral view; *d*, mandible; *e*, maxilla; *f*, maxilliped; *g*, antennule; *h*, antenna; *i*, pleopod 1.

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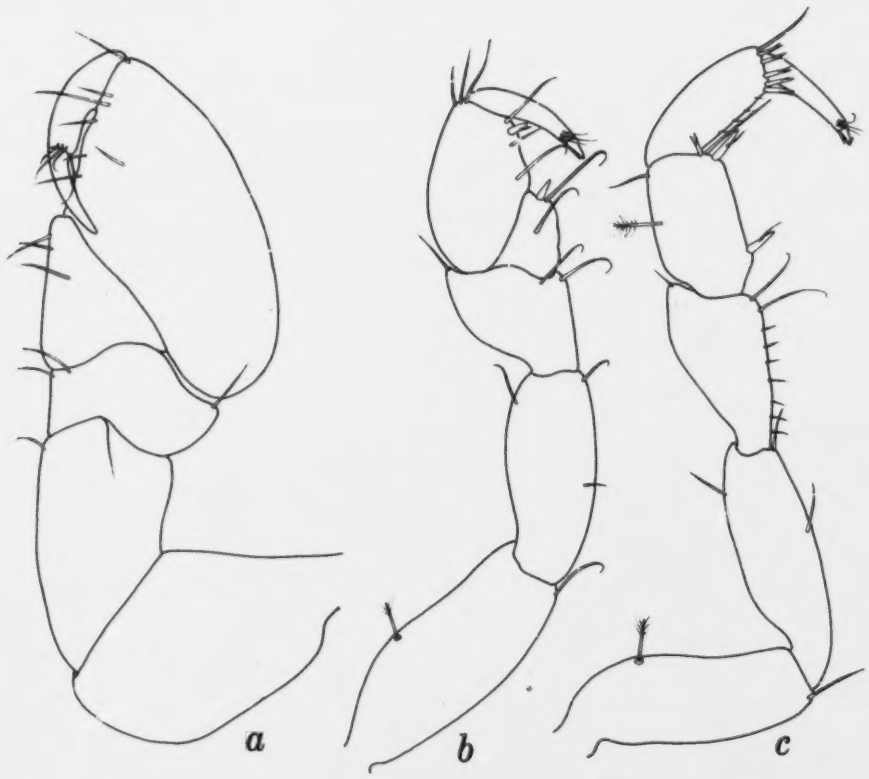

FIGURE 16.—*Quantanthura sinuata*, new species: *a*, pereopod 1; *b*, pereopod 2; *c*, pereopod 3.

cephalon not extending beyond low, rounded, triangular rostrum. Eyes lacking. Pleonites 1–5 fused; epimere 1 wider than 2; epimeres 2–4 subequal; 5 twice width of 4; pleonite 6 free, with posterior margin middorsally bilobed. Telson elongate-elliptical, with low, rounded, middorsal, longitudinal ridge becoming obsolete distally; distal margin broadly and evenly rounded; low, raised, marginal rim present; ventrally covex; two basal statocysts present.

Antennule with basal segment longer than three distal segments together; flagellum of five articles, three distal articles each with single aesthetasc. Antennal flagellum with seven articles. Mandibular palp with second segment one and one-half times length of first; distal segment with two terminal fringed spines; incisor of three cusps; lamina dentata with four blunt marginal teeth; molar broadly rounded. Maxilla with six distal spines. Maxilliped with broad endite reaching to middle of fifth palp segment, distally rounded, with single seta; second segment subequal to four distal segments together; third segment narrow, short; distal segment oval, with six setae. Pereopod 1 unguis only slightly shorter than remainder of dactylus; propodus broad, palm almost straight, sparsely setose; carpus triangular, distally rounded. Pereopod 2 much less robust than 1, unguis about one-fifth length of dactylus; propodal palm with single distal sensory spine; carpus with single distal spine. Pereopods 4–7 propodi with several slender sensory spines on distal margins; carpi broadly triangular, with single proximal and distal sensory spine. Pleopod 1 exopod operculiform, widest at midlength, three times width of endopod, outer surface with ridge close to lateral margin. Uropodal exopod dorsal, elongate-oval, outer margin faintly sinuate; en-

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dopod not quite reaching telesonic apex, proximately wider than distal margin of basis; latter triquetrous.

REMARKS.—Kensley and Koening (1979) summarised the characteristics of the three described species of *Quantanthura*. *Quantanthura sinuata* agrees with these species in the overall structure of the body, mouthparts, pereonal and pleonal appendages, but is distinguished by the following characters: the broadly ovate, uropodal exopod with a sinuate outer margin, propodi and carpi of pereopods 1 and 2 bearing very few setae, the posterior pereopods sparsely setose, the terminal mandibular palp segment bearing only two spines, and the lamina dentata of the molar having fewer serrations.

ETYMOLOGY.—The specific name refers to the sinuate outer margin of the uropodal exopod.

Genus *Valoranthura*

Valoranthura abyssorum (Norman and Stebbing)

FIGURE 17

Anthelura abyssorum Norman and Stebbing, 1886:127, pl. 27: fig. 2.
Valoranthura abyssorum.—Kensley, 1978b:790, figs. 8, 9.

MATERIAL.—USNM 185011, Sta WHOI 197, 1 ovig. ♀, 11.2 mm; USNM 185011, Sta WHOI 326, 1 juv, 4.5 mm, 1 sub ♂, damaged; SIO, Sta WHOI 326, 1 juv, 8.8 mm.

PREVIOUS RECORDS.—Davis Straits, North Atlantic, 3500 m.

Family PARANTHURIDAE

Genus *Bullowanthura*

Bullowanthura aquitanica, new species

FIGURES 18, 19

MATERIAL.—Holotype: USNM 185018, Sta WHOI Allen 40, 1 ovig. ♀, 4.5 mm. Paratypes: SIO: Sta WHOI Allen 40, 3 non-ovig. ♀, 4.5 mm, 2 juvs. Additional material: USNM 185020, Sta WHOI Allen 56, 1 ovig. ♀, 4.2 mm, 1 ♂, 5.0 mm, 4 non-ovig. ♀, 2 juvs. ZMC: Sta WHIO Allen 56, 1 ovig. ♀, 3.9 mm, 1 ♂, 5.0 mm, 1 non-ovig. ♀.

DESCRIPTION.—*Ovigerous Female:* Integument delicate, not indurate. Body proportions: $C < 1 > 2 < 3 < 4 = 5 > 6 > 7$. Rounded anterolateral corners of cephalon extending beyond rostrum; eyes lacking. Pleonites free; pleonites 1–5 subequal in length; pleonite 6 slightly longer; with convex posterior margin. Telson lanceolate, with hyaline border; apex rounded; large, proximal, median statocyst.

Basal antennular peduncle segment subequal in length to second and third segments together; third segment with distal cluster of simple elongate setae; flagellum 2-articulate, small terminal segment with three aesthetascs. Antennal flagellum of four short articles. Mandibular palp of single short segment bearing terminal seta. Maxilliped with rudimentary endite; palp of two segments, terminal segment setose, tiny. Pereopod 1 subchelate, propodus expanded, palm with bluntly triangular proximal lobe bearing six sensory spines; carpus, merus, and ischium with simple setae on posterior margins. Pereopod 2 subchelate, propodal palm convex, with three sensory spines; carpus with two relatively elongate sensory spines. Pereopods 4–7 propodi with two elongate sensory spines; carpi short, triangular, with one sensory spine. Pleopod 1 exopod operculiform, two and one-half times wider than and subequal in length to endopod. Uropodal exopod broadly oval, with hyaline margin and numerous marginal plumose setae; endopod narrowly elongate, extending by half its length beyond telsonic apex, with several elongate distal setae; basis longer than endopod, with several marginal setae. Four pairs of oostegites on pereonites 2–5.

Male: Antennular flagellum of nine or ten articles bearing dense whorls of fine aesthetascs. Pereopod 1 propodal palm straight, with six sensory spines and dense band of simple setae on inner surface. Pleonites relatively more elongate

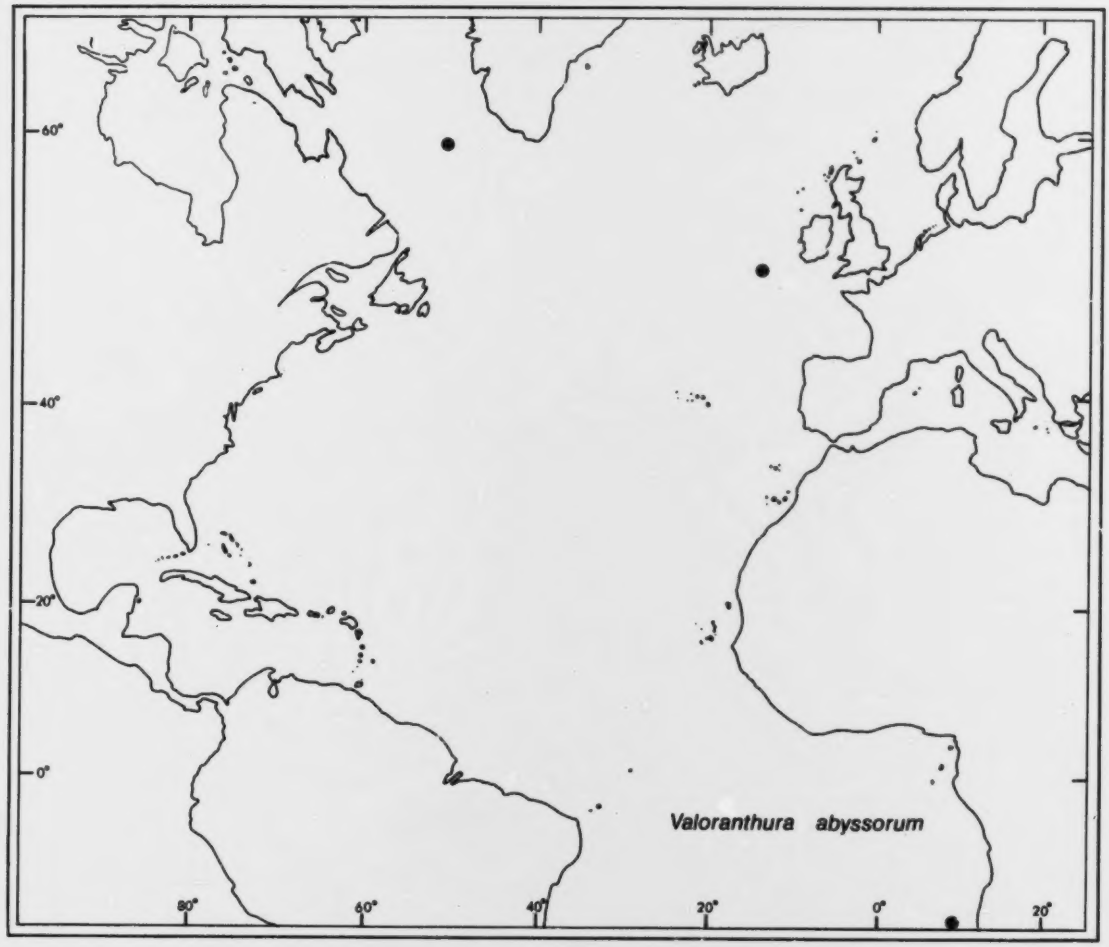

FIGURE 17.—Distribution of *Valoranthura abyssorum*.

and wider than in female. Pleopods relatively more elongate than in female, with more strongly developed marginal plumose setae. Pleopod 1 exopod distinctly longer than endopod; pleopod 2 with copulatory stylet on endopod extending beyond apex of ramus; exopod with transverse suture at about midlength.

REMARKS.—The genus *Bullowanthura* Poore was erected to contain the single species, *B. pambula* Poore, 1979, from 8–69 m off New South Wales and Victoria, Australia. The genus closely resembles *Leptanthura*, but is distinguished by the single-segmented mandibular palp. *Bullowanthura aquitanica* differs from the Australian species chiefly in the more narrowly elongate uropodal endopod, the lanceolate telson, shorter mandibular palp segment, and by several subtler details in the pereopods and uropodal exopod.

ETYMOLOGY.—The specific name is derived from one of the Latin names for the Bay of Biscay, Aquitanicus Sinus, the type-locality for the species.

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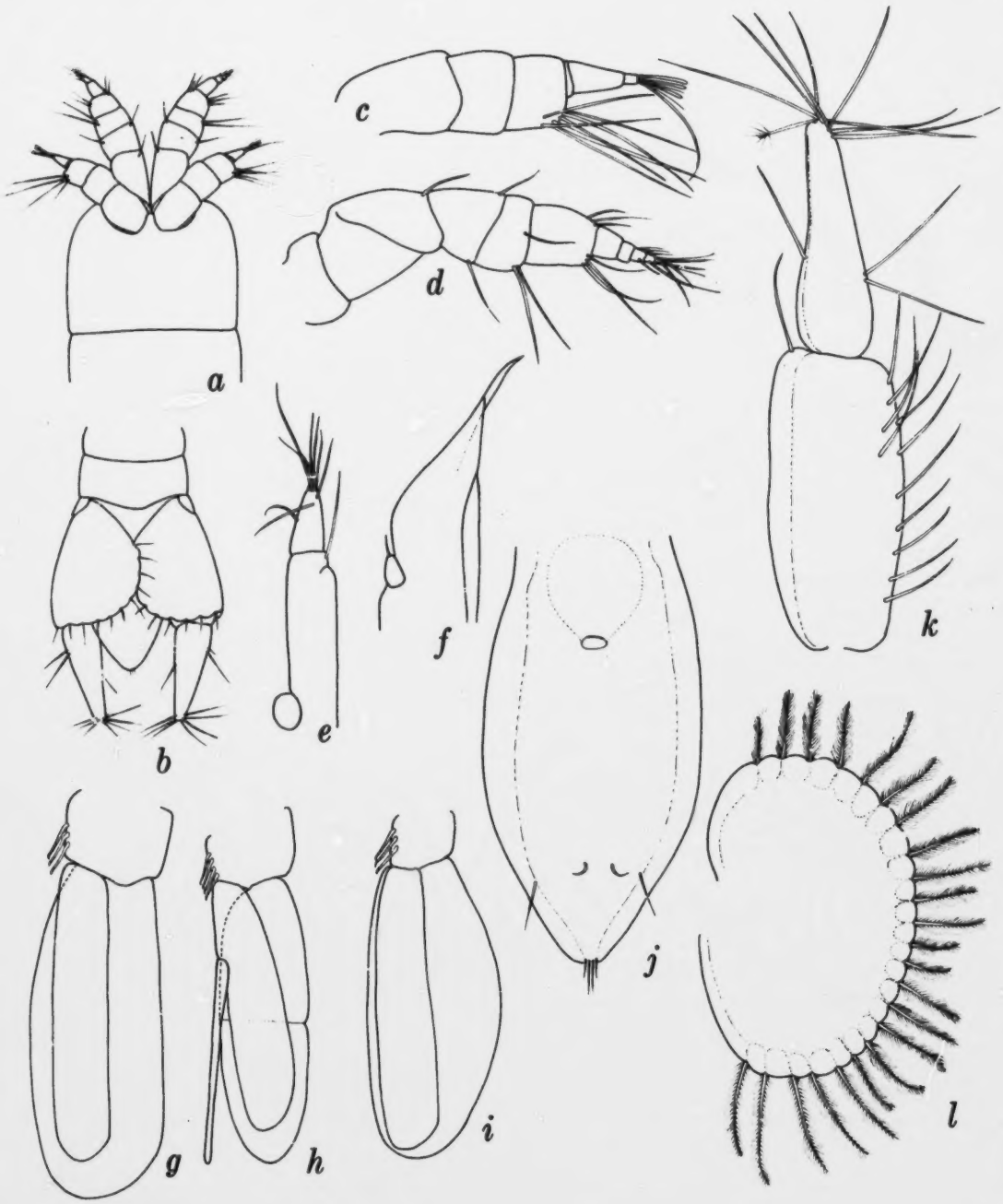

FIGURE 18.—*Bullowanthura aquitanica*, new species: *a*, cephalon; *b*, tailfan; *c*, antennule; *d*, antenna; *e*, maxilliped; *f*, mandible; *g*, pleopod 1 ♂; *h*, pleopod 2 ♂; *i*, pleopod 1 ♀; *j*, telson; *k*, uropodal basis and endopod; *l*, uropodal exopod.

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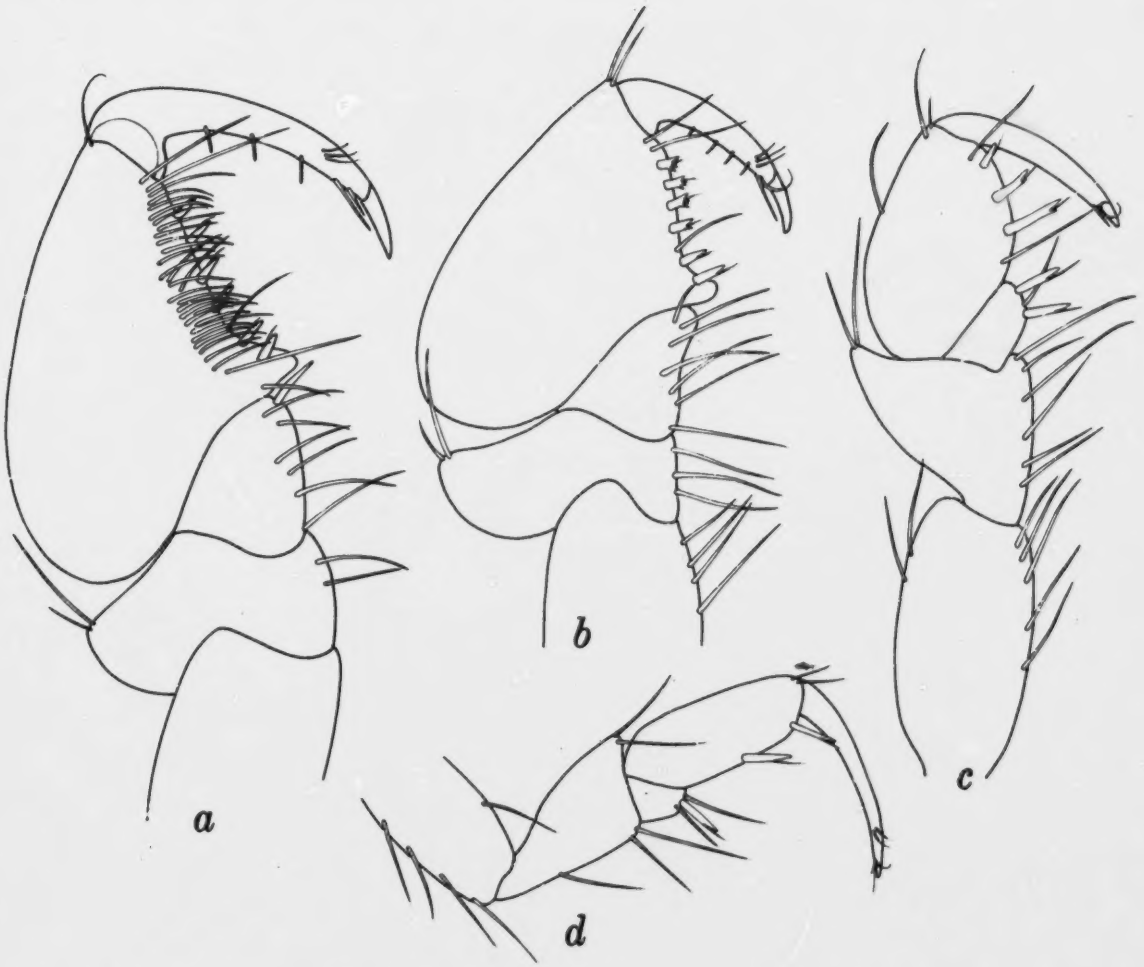

FIGURE 19.—*Bullowanthura aquitanica*, new species: *a*, pereopod 1 ♂; *b*, pereopod 1 ♀; *c*, pereopod 2 ♀; *d*, pereopod 7.

Genus *Calathura*

Calathura brachiata (Stimpson)

Anthura brachiata Stimpson, 1853:43.
Calathura brachiata.—Norman and Stebbing, 1886:131, pl. 26: fig. 1.

MATERIAL.—USNM 185019, sta WHOI 209, 1 ♂, 30.5 mm, 2 non-ovig. ♀, 18.0 mm, 7 juvs; SIO; Sta WHOI E3, 2 juvs; sta WHOI Allen 61, 1 juv.

PREVIOUS RECORDS.—Circumarctic-Boreal, 5–2500 m (see Hult, 1941, map 3, for distribution).

Genus *Leptanthura*

Leptanthura affinis (Bonnier)

FIGURES 20–22; PLATE 4

Calathura affinis Bonnier, 1896:568, pl. 31: fig. 3.
Leptanthura affinis.—Barnard, 1925:150.—Nierstrasz, 1941: 242.—Poore, 1980:62.

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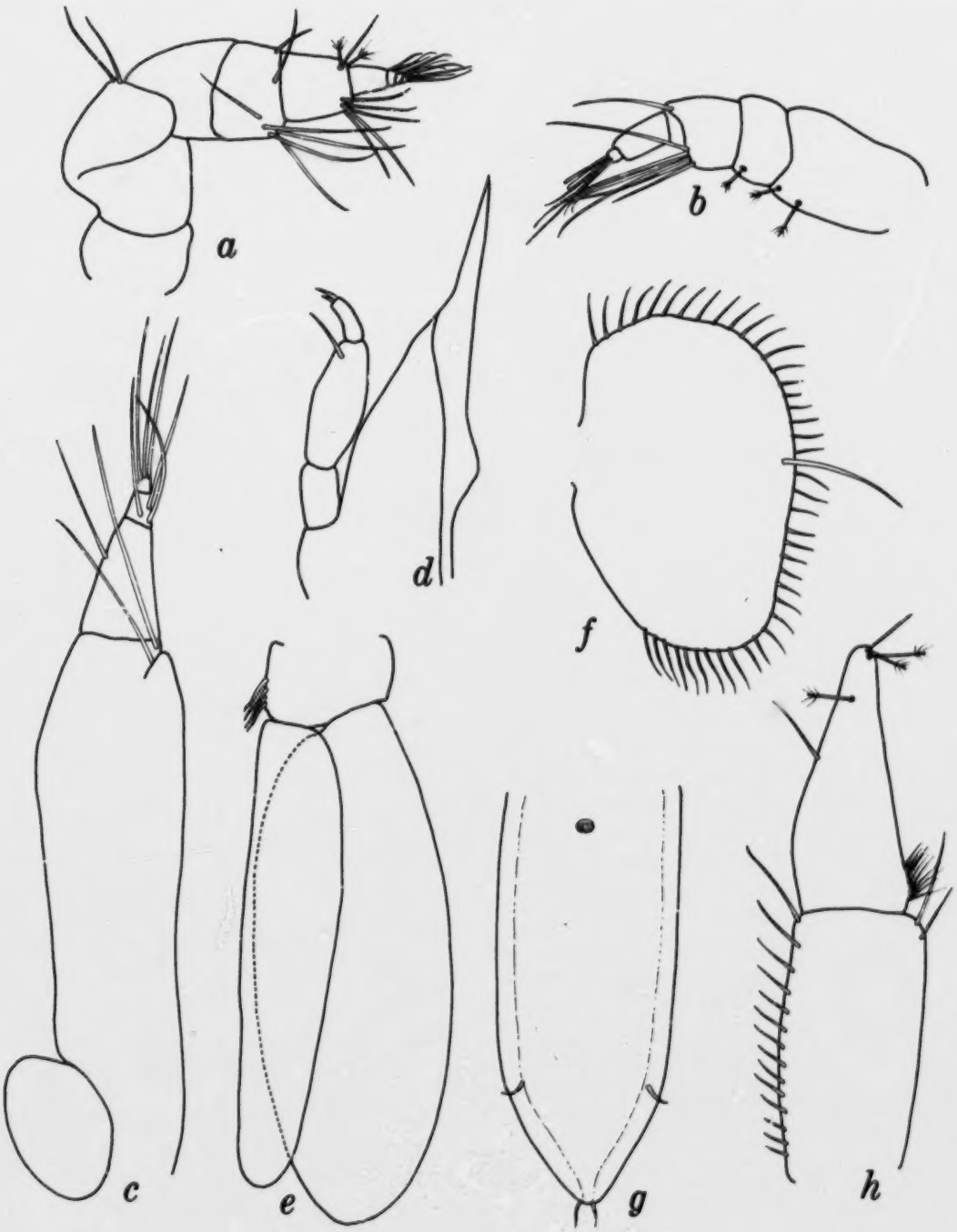

FIGURE 20.—*Leptanthura affinis* (Bonnier): *a*, antenna; *b*, antennule; *c*, maxilliped; *d*, mandible; *e*, pleopod 1; *f*, uropodal exopod; *g*, telson; *h*, uropodal basis and endopod.

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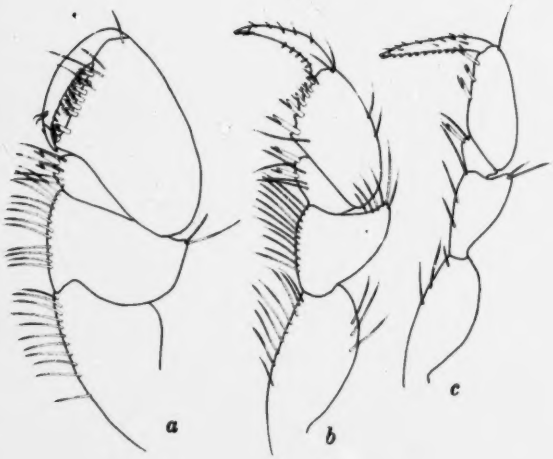
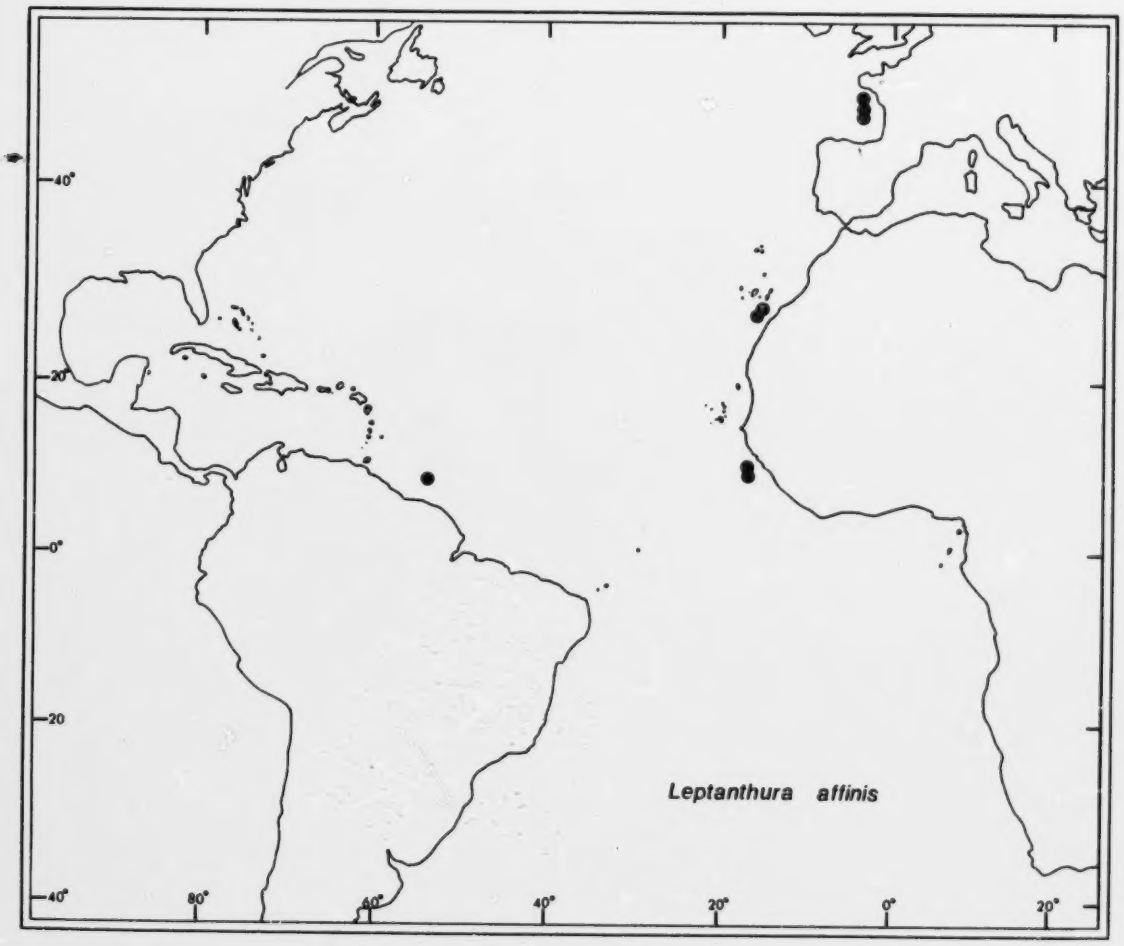


FIGURE 21.—*Leptanthura affinis* (Bonnier): *a*, pereopod 1 ♀; *b*, pereopod 2 ♀; *c*, pereopod 7.

FIGURE 22.—Distribution of *Leptanthura affinis* (Bonnier).



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MATERIAL.—USNM 185008, Sta WHOI Allen 65, 4 non-ovig. ♀, 11.5–13.0 mm, 7 juvs; USNM 185009, Sta WHOI 145, 1 non-ovig. ♀, 14.0 mm, 3 juvs; USNM 185039, Sta WHOI 297, 3 ovig. ♀, 9.5–11.0 mm, 1 non-ovig. ♀, 13.0 mm, 6 juvs; SIO: Sta WHOI Allen 33, 1 juv; Sta WHOI Allen 44, 4 juvs; Sta WHOI Allen 6701, 2 juvs; Sta WHOI Allen 6704, 1 non-ovig. ♀, 10.5 mm; Sta WHOI 142, 1 ovig. ♀, 12.8 mm, 3 non-ovig. ♀, 10.0–13.0 mm, 12 juvs.

DESCRIPTION.—*Ovigerous Female:* Integument moderately indurate. Body proportions: C < 1 = 2 = 3 < 4 > 5 > 6 > 7. Cephalon with low triangular rostrum not extending as far as rounded anterolateral lobes. Pereonites 4–6 each with single obsolete middorsal pit. Pleonites 1–4 subequal in length; pleonites 5 and 6 subequal in length; pleonite 6 with shallow middorsal notch in posterior margin. Telson dorsally slightly convex, proximal two-thirds parallel-sided, distal third tapering to narrowly rounded apex.

Third antennular peduncle segment with six elongate simple setae distally; flagellum 2-articulate. Antennal peduncle segments 4 and 5 with several elongate simple setae ventrodistally; flagellum of four short articles. Mandibular palp with second segment three times length of third. Maxilliped with obsolete endite; palp with three distal setose segments. Pereopod 1 with propodal palm straight, bearing seven multidentate spines; carpus with two stout sensory spines; elongate simple setae on carpus, merus, and ischium. Pereopods 2 and 3 with propodi not as inflated as in pereopod 1, with six sensory spines on dentate palmar margin; carpi with two sensory spines; carpi, meri, and ischia with setose posterior margins. Pereopods 4–7 with three sensory spines on propodi; single spine on carpi. Pleopod 1 exopod operculiform; endopod half width of and slightly shorter than exopod. Uropodal exopod broadly oval, margin setose; endopod elongate-triangular, apically narrowly rounded.

REMARKS.—Although Barnard (1925) suggested that *L. affinis* might be synonymous with *L. tenuis* (Sars), comparison of Bonnier's and Sars' figures reveal a significant difference. The narrowly triangular, uropodal endopod extending about half its length beyond the telson in the present material and in Bonnier's figure, differs markedly from the elongate-oval uropodal endopod extending less than its length beyond the telson in Sars' figure.

PREVIOUS RECORDS.—Bay of Biscay, 1410 m.

Leptanthura argentinae, new species

FIGURES 23–25

MATERIAL.—Holotype: USNM 185021, Sta WHOI 245, 1 ovig. ♀, 5.9 mm. Allotype: USNM 185022, Sta WHOI 245, 1 ♂, 7.5 mm. Paratypes: USNM 185023, Sta WHOI 245, 2 ovig. ♀, 5.4–5.5 mm, 4 ♂, 6.0–7.5 mm, 70 non-ovig. ♀ and juvs; ZMC: Sta WHOI 245, 1 ovig. ♀, 5.5 mm, 1 ♂, 7.5 mm, 5 non-ovig. ♀. Additional material: SIO: Sta WHOI 237, 2 ovig. ♀, 8.0–8.8 mm, 4 ♂, 7.9–8.8 mm, 8 non-ovig. ♀ and juvs; Sta WHOI 262, 1 ovig. ♀ 6.4 mm; Sta WHOI 259, 1 ovig. ♀, 6.0 mm, 3 ♂, 6.5–7.0 mm, 9 non-ovig. ♀ and juvs.

DESCRIPTION.—*Ovigerous Female:* Integument thin, delicate, non-indurate. Proportions: C < 1 = 2 = 3 < 4 = 5 > 6 > 7. Rostrum reaching as far as rounded dorsolateral lobes of cephalon. Pleonites 1–4 subequal in length; pleonites 5 and 6 subequal, longer than preceding segments. Telson parallel-sided, with broad hyaline margin, distal margin broadly and evenly rounded; large single proximal statocyst present.

Antennular peduncle with basal segment longer and broader than three distal segments together; flagellum of four articles. Antennal flagellum of three articles. Mandibular palp with second segment twice length of first; third segment with two terminal spines. Maxilliped with obsolete endite; palp with four setose articles beyond endite. Pereopod 1 propodus with triangular proximal "thumb," palm very slightly concave, with nine multidentate sensory spines; carpus with two sensory spines. Pereopods 2–3 propodi not as large as in pereopod 1, palm straight, with seven multidentate sensory spines; carpi with two sensory spines. Pereopods 4–7 with unguis about one-sixth length of dactylus; propodus with four spines on posterior margin; carpus with

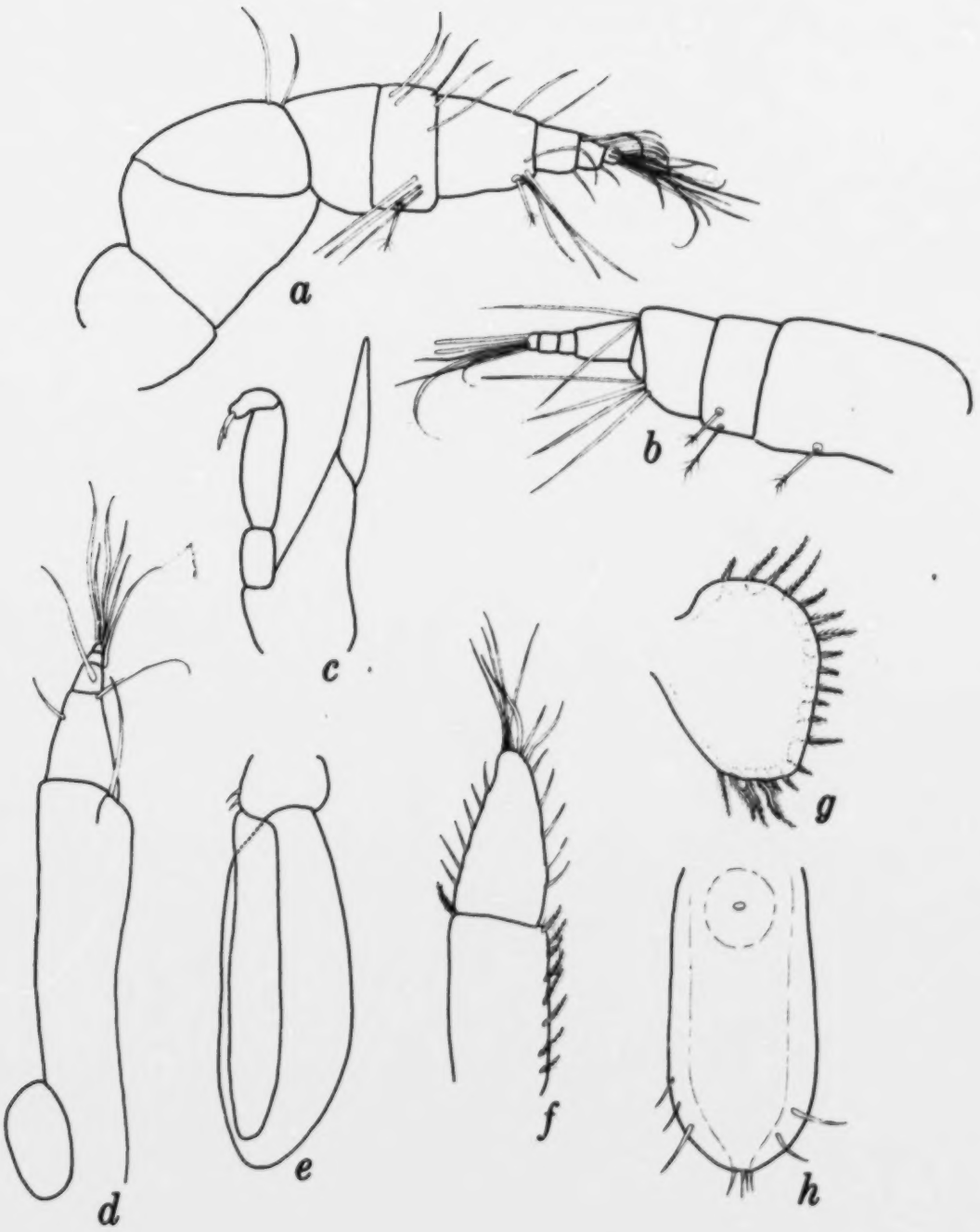

FIGURE 23.—*Leptanthura argentinae*, new species: *a*, antenna; *b*, antennule; *c*, mandible; *d*, maxilliped; *e*, pleopod 1 ♀; *f*, uropodal basis and endopod ♀; *g*, uropodal exopod ♀; *h*, telson ♀.

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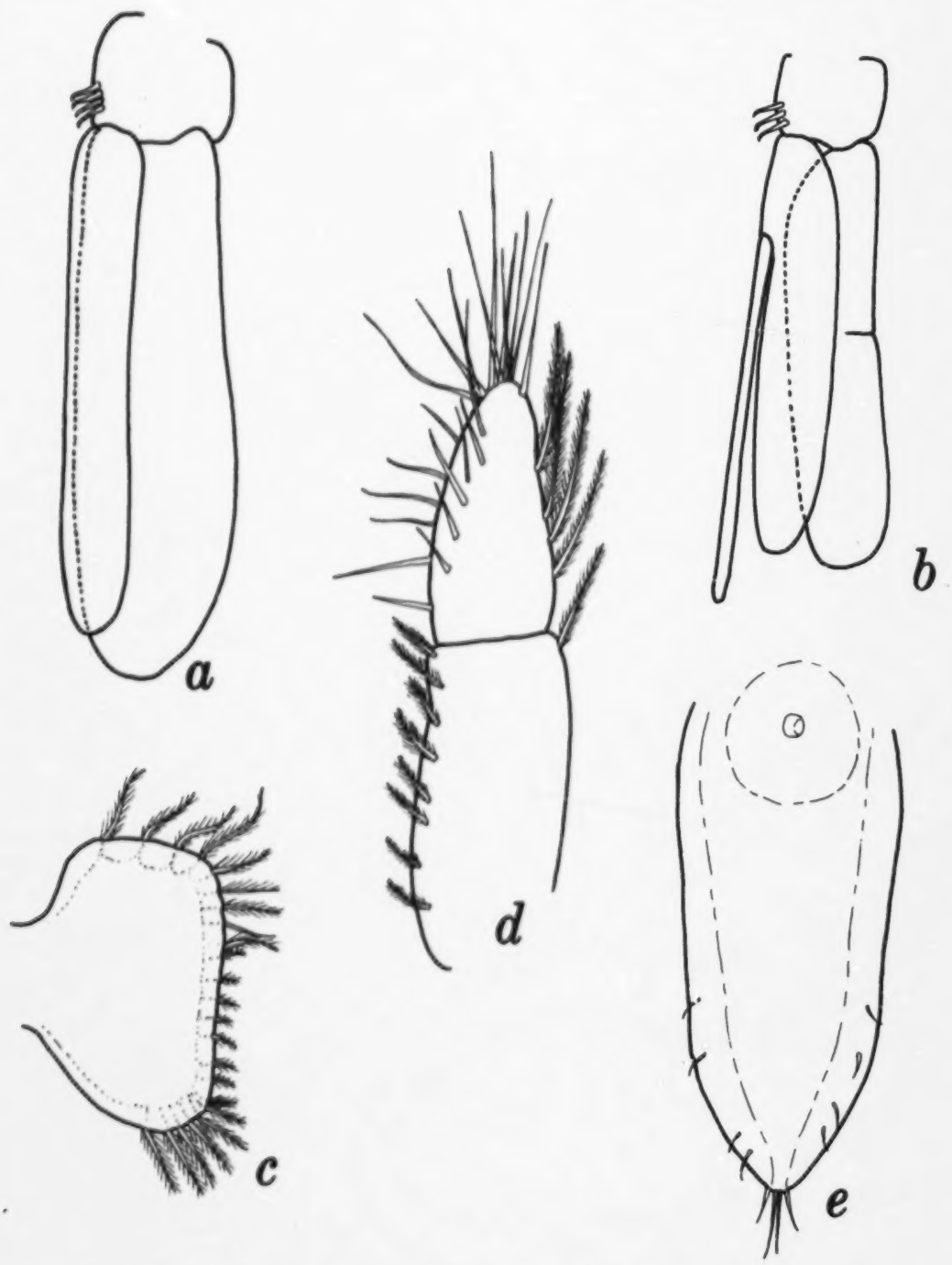

FIGURE 24.—*Leptanthura argentinae*, new species: *a*, pleopod 1 ♂; *b*, pleopod 2 ♂; *c*, uropodal exopod ♂; *d*, uropodal basis and endopod ♂; *e*, telson ♂.

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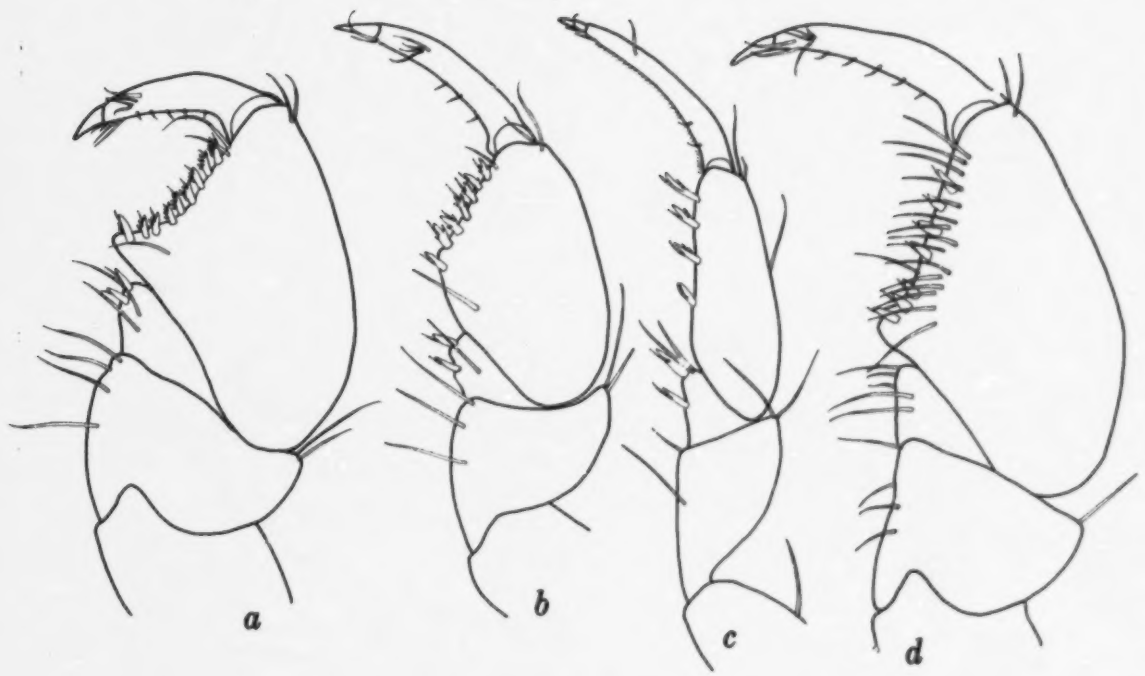

FIGURE 25.—*Leptanthura argentinae*, new species: *a*, pereopod 1 ♀; *b*, pereopod 2 ♀; *c*, pereopod 7; *d*, pereopod 1 ♂.

two spines. Pleopod 1 exopod operculiform; endopod slightly shorter and less than half of exopod. Uropodal exopod broadly oval, with hyaline margin fringed with plumose setae; endopod triangular, distally narrowly rounded, setose, subequal in length to basis, about half its length beyond telsonic apex.

Male: Body more elongate than in female. Antennular flagellum of 10 to 12 articles bearing whorls of fine aesthetascs. Pleonites relatively more elongate than in female. Pleopod 2 with copulatory stylet slender, cylindrical, extending beyond endopodal apex. Uropodal endopod relatively more elongate and setose than in female; exopod relatively wider than female, with longer straight margin. Telson tapering to narrowly rounded apex.

REMARKS.—See "Remarks" under *Leptanthura guianae*.

ETYMOLOGY.—The specific name alludes to the type-locality, the Argentine Basin off the southeast coast of South America.

Leptanthura glacialis Hodgson

FIGURE 26; PLATES 5, 6

Leptanthura glacialis Hodson, 1910:9, pl. 1: fig. 1.—Tattersall, 1921:232.—Barnard, 1925:150.—Monod, 1926:41, fig. 44.—Nierstrasz, 1941:242.—Kussakin, 1967:256, fig. 20.—Poore, 1980:62.

MATERIAL.—USNM 185040, Sta WHOI Rankin 0001, 7 ovig. ♀, 12.0–14.2 mm, 23 non-ovig. ♀ and juvs; USNM 185041, Stat WHOI 237, 9 ovig. ♀, 14.0–17.5 mm, 1 ♂, 14.5 mm, 91 non-ovig. ♀ and juvs; SIO: Sta WHOI I. O. DAL.13, 5 ovig. ♀, 12.0–13.5 mm, 25 non-ovig. ♀ and juvs; Sta WHOI 242, 3 non-ovig. ♀; Sta WHOI 247, 13 non-ovig. ♀ and juvs; Sta WHOI 256, 1 non-ovig. ♀; Sta WHOI Ch35 Dr 12, 2 juvs.

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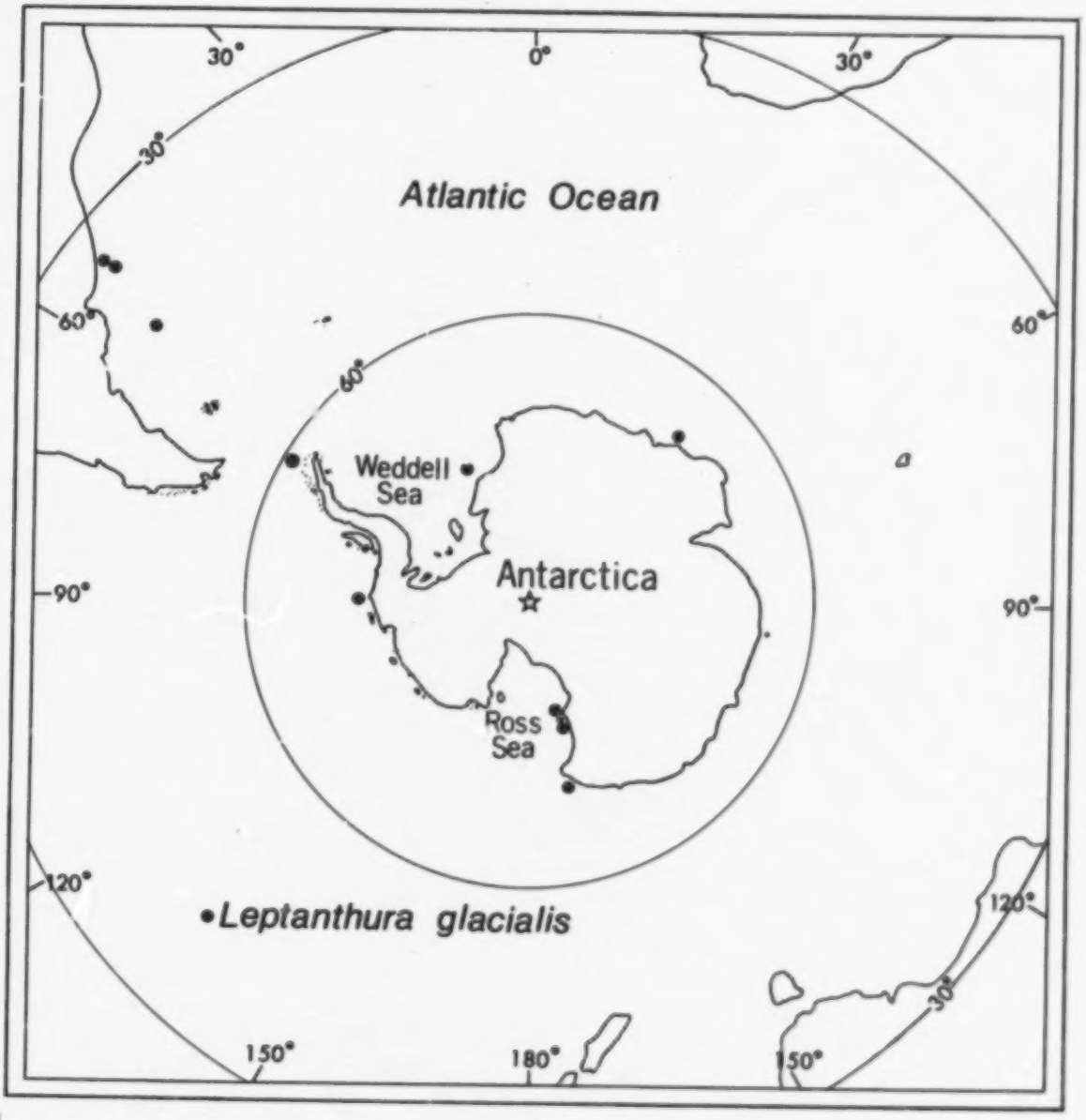

FIGURE 26.—Distribution of *Leptanthura glacialis*.

REMARKS.—No significant differences could be found between the present material from the Weddell Sea, the South Shetland Islands, and the Argentine Basin. Although the ovigerous females from the Weddell Sea seem to be slightly smaller than those from the Argentine Basin, the length-ranges overlap, and there is insufficient material to test if this difference is significant. Assuming earlier records to be accurate, *L. glacialis* would seem to have a geographical distribution in the southern hemisphere reflecting that of *Calathura brachiata* in the northern hemisphere, i.e., circum-

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polar and extending towards the equator along the continental shelves. *Leptanthura glacialis* supports Monniot (1979) in her statement that the Argentine Basin fauna appears to have Antarctic affinities.

Leptanthura guianae, new species

FIGURES 27, 28

MATERIAL.—Holotype: USNM 185024, Sta WHOI 295, 1 ovig. ♀, 6.9 mm. Allotype: USNM 185025, Sta WHOI 295, 1 ♂, 7.0 mm. Paratypes: USNM 185026, Sta WHOI 295, 4 ovig. ♀ 4.5–6.0 mm, 1 ♂, 7.0 mm, 1 sub ♂, 7.0 mm, 4 non-ovig. ♀, 43 juvs and mancas. ZMC: Sta WHOI 295, 2 ovig. ♀, 4.5–6.0 mm, 2 non-ovig. ♀. Additional material: SIO: Sta WHOI 293, 3 ovig. ♀, 5 non-ovig. ♀, 8 juvs; Stat WHOI 297, 5 ovig. ♀, 1 ♂, 8 non-ovig, ♀, 31 juvs and mancas.

DESCRIPTION.—*Ovigerous Female:* Integument thin, non-indurate. Proportions: C < 1 = 2 < 3 < 4 > 5 > 6 > 7. Pleonite 1 longer than pleonite 2; pleonites 2–4 subequal, pleonite 5 twice length of 4; pleonite 6 longer than 5, with convex posterior margin. Telson dorsally concave, tapering gently distally to rounded apex; large proximal statocyst present.

Antennular peduncle with basal segment longer than three distal segments together; flagellum of three articles. Antennal flagellum of five short articles. Mandibular palp with second segment two and one-half times length of first; terminal segment with two serrate spines, subequal in length to first segment. Maxilliped with obsolete endite; palp with two indistinct segments. Pereopod 1 propodal palm straight, with low rounded proximal "thumb," armed with eight sensory spines, seven of which multidentate; carpus with several setae and single distal sensory spine. Pereopod 2 propodal palm with seven sensory spines, lacking proximal thumb; carpus with single distal sensory spine. Pereopods 4–7 with finely fringed scales on posterior margin of dactylus; propodus with two elongate sensory spines; carpus short, triangular, with two elongate sensory spines. Pleopod 1 exopod operculiform, one third longer and two and one-half times wider than endopod, widest at midlength. Uropodal endopod triangular, distally rounded, extending by half its length beyond telsonic apex; basis with several marginal plumose setae, exopod dorsal, subcircular in circumference, with short plumose marginal setae.

Male: Antennular flagellum with ten aesthetasc-bearing articles. Pereopod 1 propodal palm straight, bearing eight sensory spines, barely demarked proximal thumb, numerous simple setae on inner surface; carpus with single distal sensory spine. Pleon more elongate and wider than in female. Pleopods more elongate than in female, with longer plumose setae; pleopod 1 exopod widest in distal half; pleopod 2 exopod with suture at midlength, slightly longer than endopod; copulatory stylet extending slightly beyond rami, apically tapering. Telson more broadly elliptical than in female. Uropodal basis and endopod with more plumose setae than in female; exopod elongate-oval.

REMARKS.—*Leptanthura guianae* resembles *L. argentinae* (described above) in overall size (ovigerous female *L. guianae* 4.5–6.9 mm, ovigerous female *L. argentinae* 5.4–8.0 mm) and in general tail-fan structure. In *L. argentinae*, however, the uropodal endopod in both male and female is more elongate, the uropodal exopod less subcircular, the maxillipedal palp is distinctly 4-segmented, the propodal thumb of pereopod 1 ♀ is stronger, and pereopods 4–7 carry more spines on the propodi.

ETYMOLOGY.—The specific name alludes to the type-locality, the Guiana Basin off northeastern South America.

Leptanthura micrura, new species

FIGURES 29, 30

MATERIAL.—Holotype: USNM 185027, Sta WHOI 169, 1 ovig. ♀, 9.6 mm. Allotype: USNM

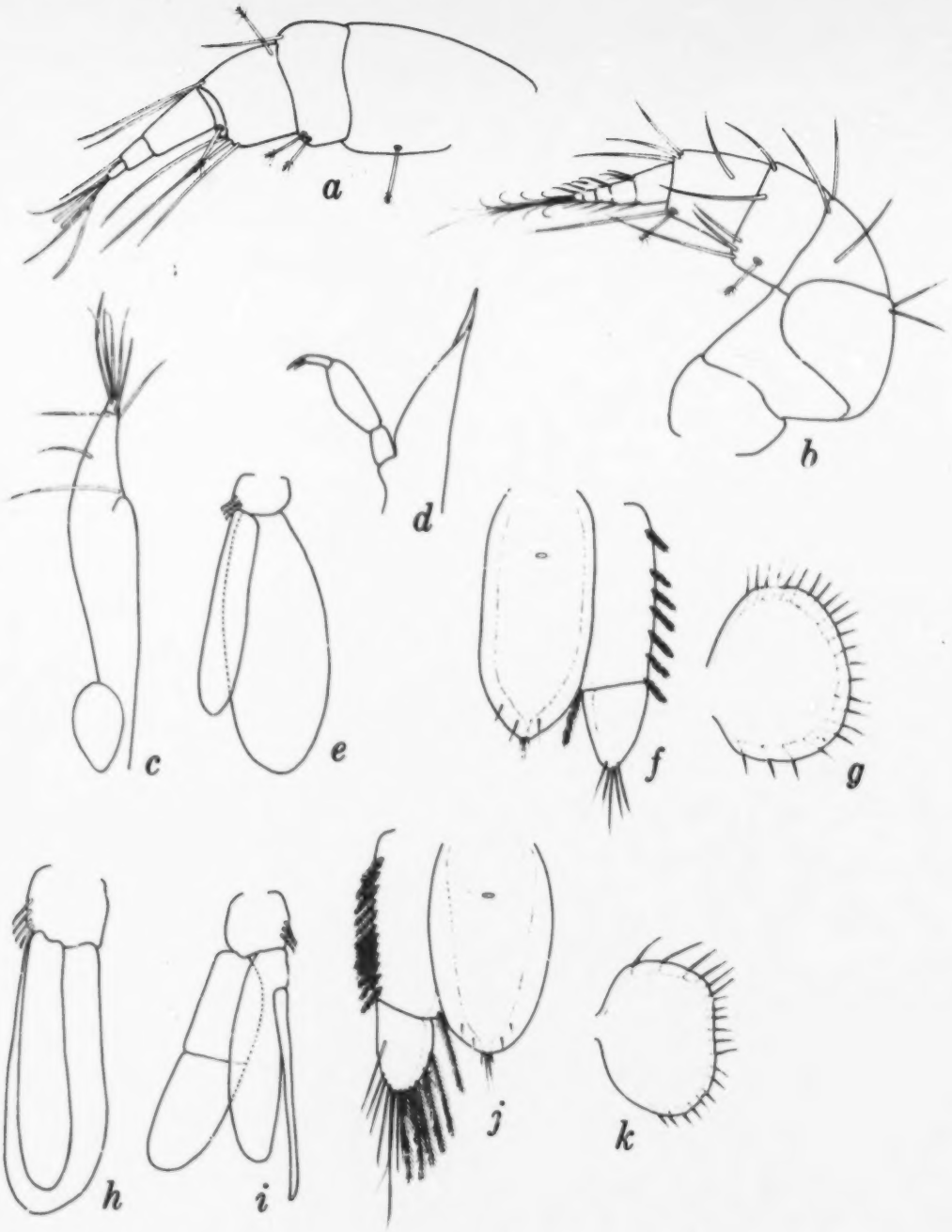

FIGURE 27.—*Leptanthura guianae*, new species: *a*, antennule; *b*, antenna; *c*, maxilliped; *d*, mandible; *e*, pleopod 1 ♀; *f*, telson and uropod ♀; *g*, uropodal expod ♀; *h*, pleopod 1 ♂; *i*, pleopod 2 ♂; *j*, telson and uropod ♂; *k*, uropodal exopod ♂.

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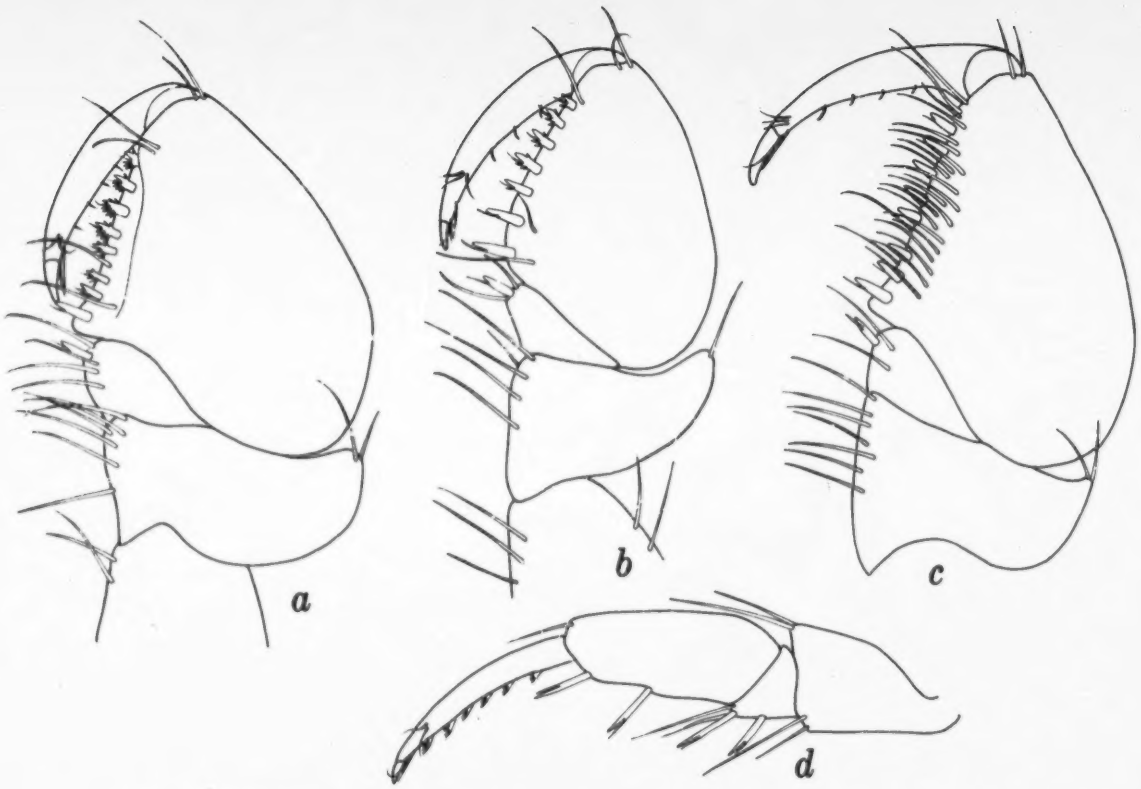

FIGURE 28.—*Leptanthura guianae*, new species: *a*, pereopod 1 ♀; *b*, pereopod 2 ♀; *c*, pereopod 1 ♂; *d*, pereopod 7.

185028, Sta WHOI 167, 1 ♂, 11.5 mm. Paratypes: USNM 185029, Sta WHOI 169, 1 ovig. ♀, 8.5 mm, 3 non-ovig. ♀, 9 juvs; USNM 185030, Sta WHOI 162, 1 non-ovig. ♀; USNM 185031, Sta WHOI 159, 2 non-ovig. ♀, 1 juv; ZMC: Sta WHOI 167, 5 non-ovig. ♀, 9 juvs; SIO: Sta WHOI 301, 1 ♂, 7.0 mm, 1 non-ovig. ♀; Sta WHOI Ch35 Dr34, 2 juvs.

DESCRIPTION.—*Ovigerous Female:* Integument non-indurate. Body proportions: C < 1 = 2 = 3 < 4 > 5 > 6 > 7. Cephalon with rounded anterolateral corners barely extending beyond rostrum. Pleonites 1–6 free; pleonite 1 twice length of 2; pleonites 2–4 subequal; pleonites 5–6 each almost twice length of 4; pleonite 6 with convex posterior margin. Telson elongate-lanceolate, dorsally gently convex, reaching to midlength of uropodal endopod; large proximal statocyst present.

Antennular basal segment longer than two following segments together; flagellum of two (possibly three) articles; three terminal aesthetascs. Antennal flagellum of three very short articles. Mandibular palp with second segment twice length of first; distal segment short, curved, with two fringed spines. Maxilliped with rudimentary endite; palp of three setose segments. Pereopod 1 propodal palm slightly convex, with four short multidentate sensory spines and few simple setae; proximal thumb with sensory spine; narrow carpus with two sensory spines. Pereopod 2 with seven sensory spines on propodal palm, proximal spines becoming elongate; carpus with two sensory spines. Pereopods 4–7 with fringed scales on dactylus; propodus with four sensory spines; short

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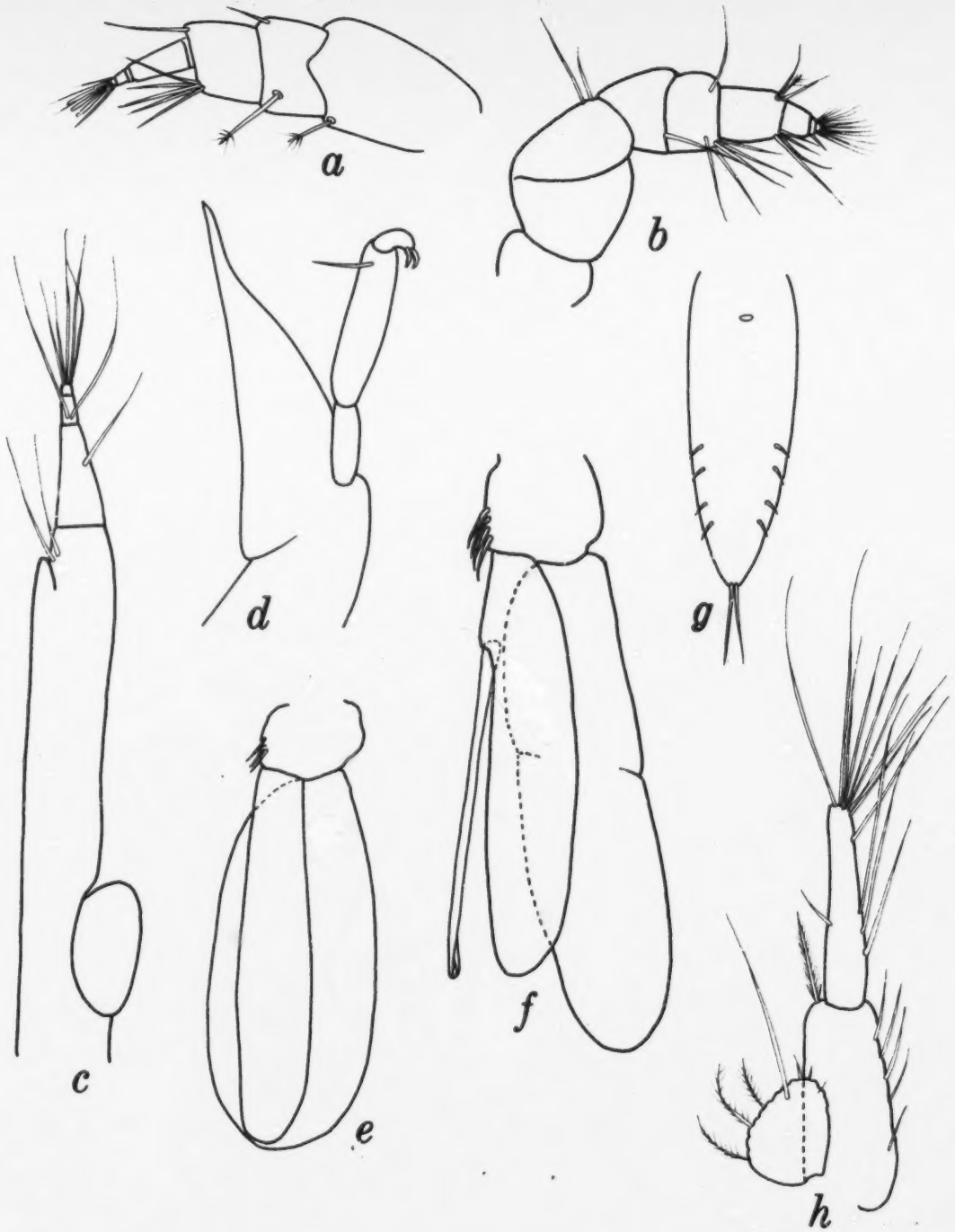

FIGURE 29.—*Leptanthura micrura*, new species; *a*, antennule; *b*, antenna; *c*, maxilliped; *d*, mandible; *e*, pleopod 1; *f*, pleopod 2 ♂; *g*, telson; *h*, uropod.

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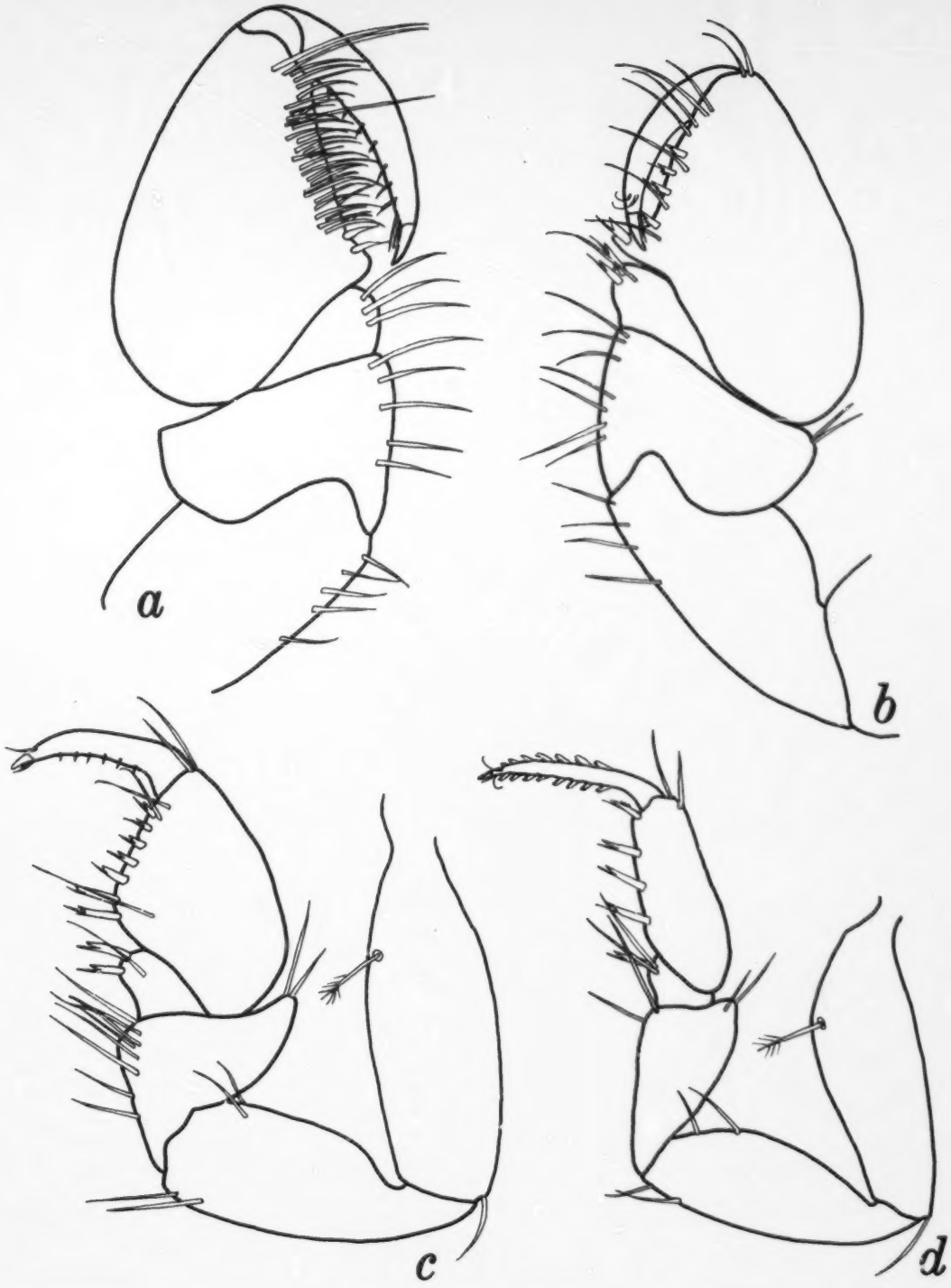

FIGURE 30.—*Leptanthura micrura*, new species: *a*, pereopod 1 ♂; *b*, pereopod 1 ♀; *c*, pereopod 2 ♀; *d*, pereopod 7.

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triangular carpus with single sensory spine. Pleopod 1 exopod operculiform, with strong ridge near medial margin, slightly more than twice width of endopod. Uropodal basis slightly more than twice longer than wide; endopod slender-elongate, subequal in length to basis, with several elongate simple setae; exopod broadly oval, half length of basis.

Male: Antennular flagellum of 12 articles bearing whorls of fine aesthetascs. Pereopod 1 propodal palm straight, with dense irregular band of simple setae on inner surface, proximal lobe low, rounded. Pleonites proportionally wider and longer than in female, to accommodate increased musculature to proportionally more elongate pleopods. Pleopod 2 copulatory stylet on endopod reaching just beyond apex of ramus.

REMARKS.—The tail-fan, and especially the elongate endopod and small exopod of the uropod are the most significant distinguishing features of this species. *Leptanthura micrura* most closely resembles *L. nunana* Poore, 1979, described from Victoria, Australia. This small, shallow-water species possesses a narrowly elongate, uropodal endopod extending well beyond the telsonic apex. Although the uropodal exopod is relatively small in *L. nunana*, it differs from *L. micrura* in being lanceolate, rather than oval in outline, while the telsons of the two species are markedly different.

ETYMOLOGY.—The specific name is derived from the Greek *mikros* (small) and *oura* (a tail) and refers to the small uropodal exopods.

Genus *Paranthura*

Paranthura argentinae Kussakin

FIGURES 31, 32

Paranthura argentinae Kussakin, 1967:200, fig. 23.—Poore, 1980:63.

MATERIAL.—USNM 185032, Sta WHOI 236, 2 non-ovig. ♀, 11.5–13.0 mm, 13 juvs.

REMARKS.—Several of the appendages are figured in greater detail than was given in the original description.

PREVIOUS RECORDS.—Argentine Basin, 399–500 m.

Paranthura possessia Kensley

PLATE 7

Paranthura possessia Kensley, 1980b:168, figs. 5, 6.

MATERIAL.—USNM 185033, Sta WHOI 236, 5 ovig. ♀, 10.0–11.0 mm, 21 juvs; USNM 185034, Sta WHOI 237, 4 ovig. ♀, 11.0–13.9 mm, 5 ♂, 10.0–11.5 mm, 4 non-ovig. ♀, 28 juvs; SIO: Sta WHOI 245, 5 juvs; Sta WHOI 262, 2 ♂, 11.5–13.5 mm, 1 non-ovig. ♀, 7 juvs; Sta WHOI 264, 1 ovig. ♀, 14.0 mm, 6 juvs.

REMARKS.—The present specimens are identified with the southern Indian Ocean species, as they agree in overall proportions, telsonic shape, number of articles in the male antennule, copulatory stylet of the male, and the total length of ovigerous females. Only the slight sinuosity of the outer margin of the uropodal exopod is less marked in the Atlantic material.

PREVIOUS RECORDS.—Crozet Islands, southern Indian Ocean, 140–490 m.

Genus *Pseudanthura*

Pseudanthura lateralis Richardson

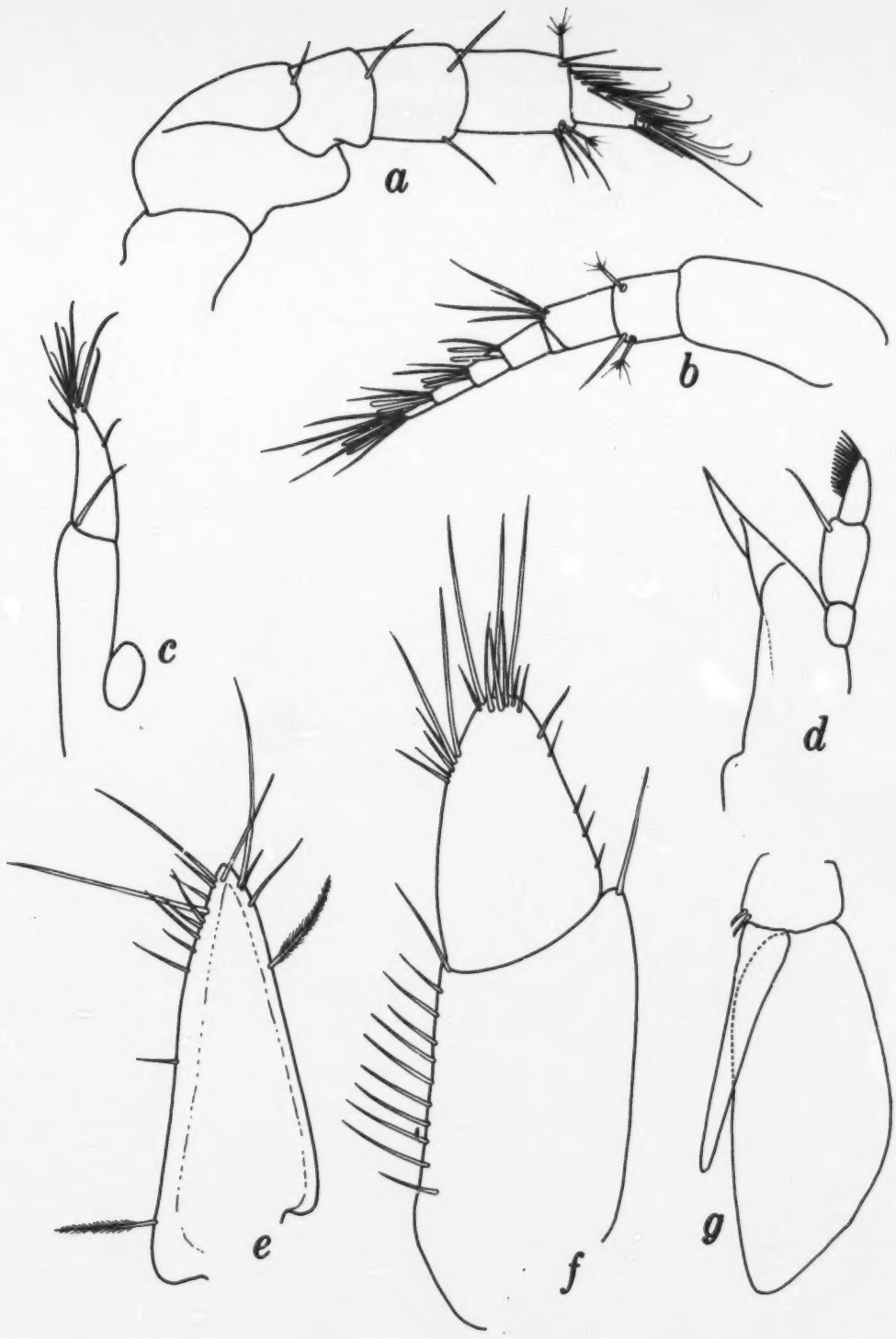
FIGURE 33; PLATES 8, 9

Pseudanthura lateralis Richardson, 1911:7.—Kensley, 1978c: 229, figs. 5, 6.—Poore, 1980:64.

MATERIAL.—SIO: Sta WHOI 191, 1 ♂, 16.0 mm, 2 non-ovig. ♀, 22 juvs. USNM 185042, Sta WHOI 192, 2 ♂, 15.4–20.4 mm, 7 non-ovig. ♀, 10 juvs.

PREVIOUS RECORDS.—Off West Africa, 930–3200 m; Off Cape Point, South Africa, 1620–1816 m.

FIGURE 31.—*Paranthura argentinae* Kussakin: *a*, antenna; *b*, antenna; *c*, maxilliped; *d*, mandible; *e*, uropodal exopod; *f*, uropodal endopod and basis; *g*, pleopod 1.



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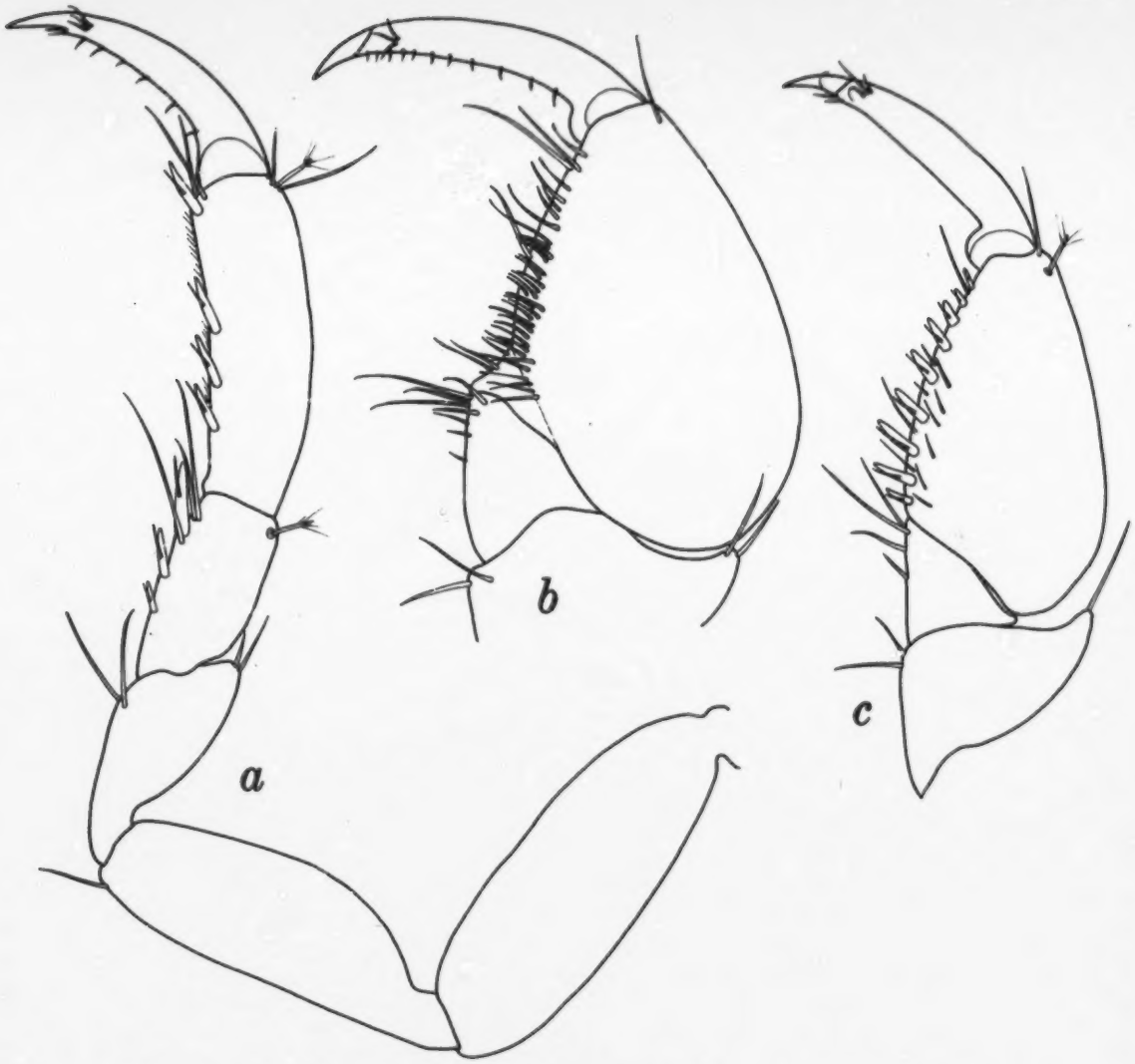

FIGURE 32.—*Paranthura argentinae* Kussakin; *a*, pereopod 7; *b*, pereopod 1 ♀; *c*, pereopod 2 ♀.

Pseudanthura recifensis, new species

FIGURES 33–35

MATERIAL.—Holotype: USNM 185035, Sta WHOI 169, 1 juv, 12.5 mm.

DESCRIPTION.—*Juvenile:* Integument indurate, brittle. Body proportions: C < 1 < 2 = 3 = 4 > 5 > 6 > 7. Cephalon lacking eyes; rostrum narrowly rounded, extending as far as rounded anterolateral corners; well-marked groove separating anterior marginal area. Pereonite 1 with midventral rounded tubercle; low submedian dorsal bulges anteriorly. Pereonites 4–6 with transverse dorsal ridge near anterior margin. Pereonite 7 about one-third length of 6. Pleonites and telson fused; two large submedian bosses representing fused pleonite 1 accommodating muscles of pleopod 1, followed by raised area with shallow

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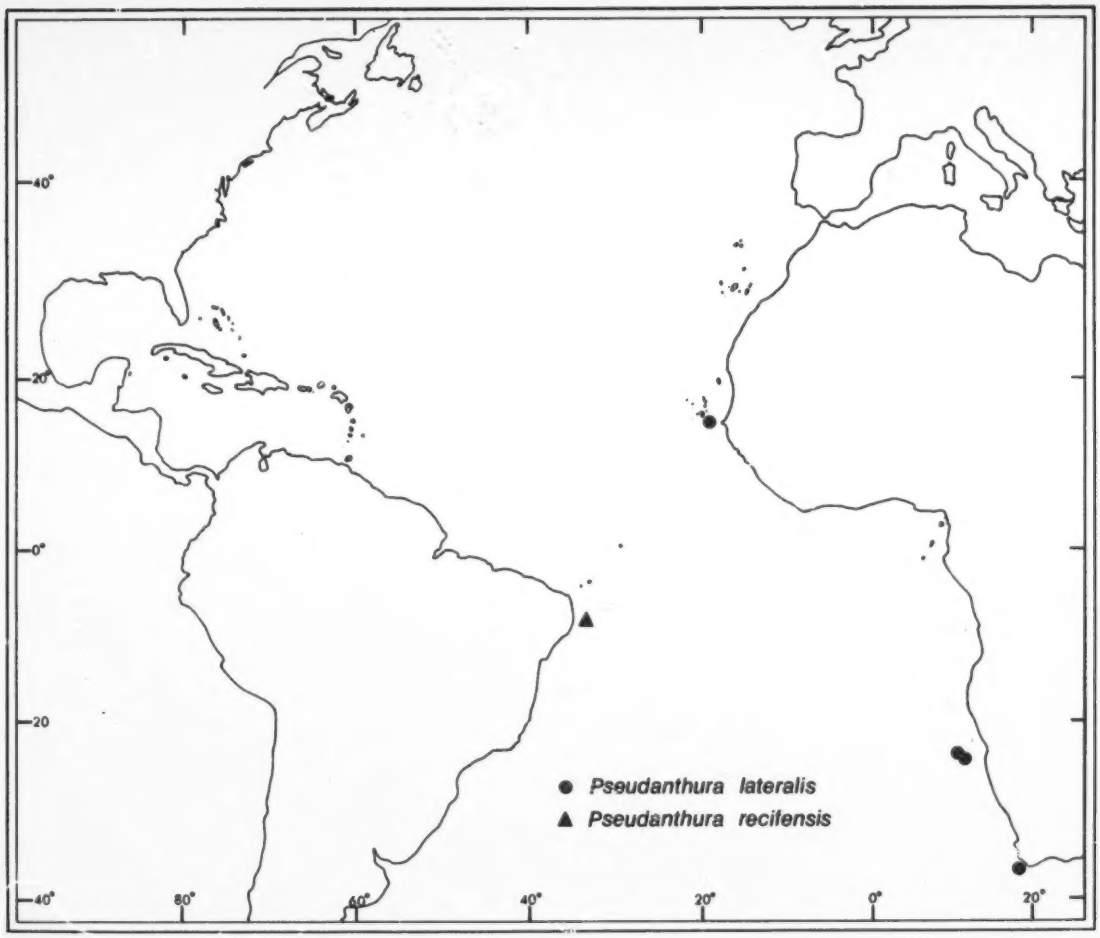

FIGURE 33.—Distribution of *Pseudanthura lateralis* and *Pseudanthura recifensis*.

grooves indicating fused pleonites 2–5; distal half of pleotelson narrowly triangular, with low, median, rounded ridge.

Basal antennular segment equal in length to two following segments together; flagellum of six articles, four distal articles each with two aesthetascs. Antennal segment 5 subequal in length to segments 3 and 4 together; flagellum of seven articles. Mandibular palp with third segment curved, armed with about 12 spines. Maxilla relatively broad, with 12 distal serrations. Maxilliped with triangular endite almost reaching distal margin of second palp segment; palp of four setose segments. Pereopod 1 subchelate, propodus expanded, ridge-like palmar margin concave, with low, rounded thumb, second ridge on inner surface also concave; both ridges bearing stout simple spines; four elongate fringed spines on inner surface proximally; carpus triangular, distally rounded, with one simple and two fringed spines. Pereopods 2–3 slender, propodus elongate-rectangular, with four sensory spines on posterior margin; carpus short, triangular. Pereopods 4–6 more elongate than pereopods 2–3, propodus with four sensory spines on posterior margin; carpus roughly rectangular, with two spines on posterior

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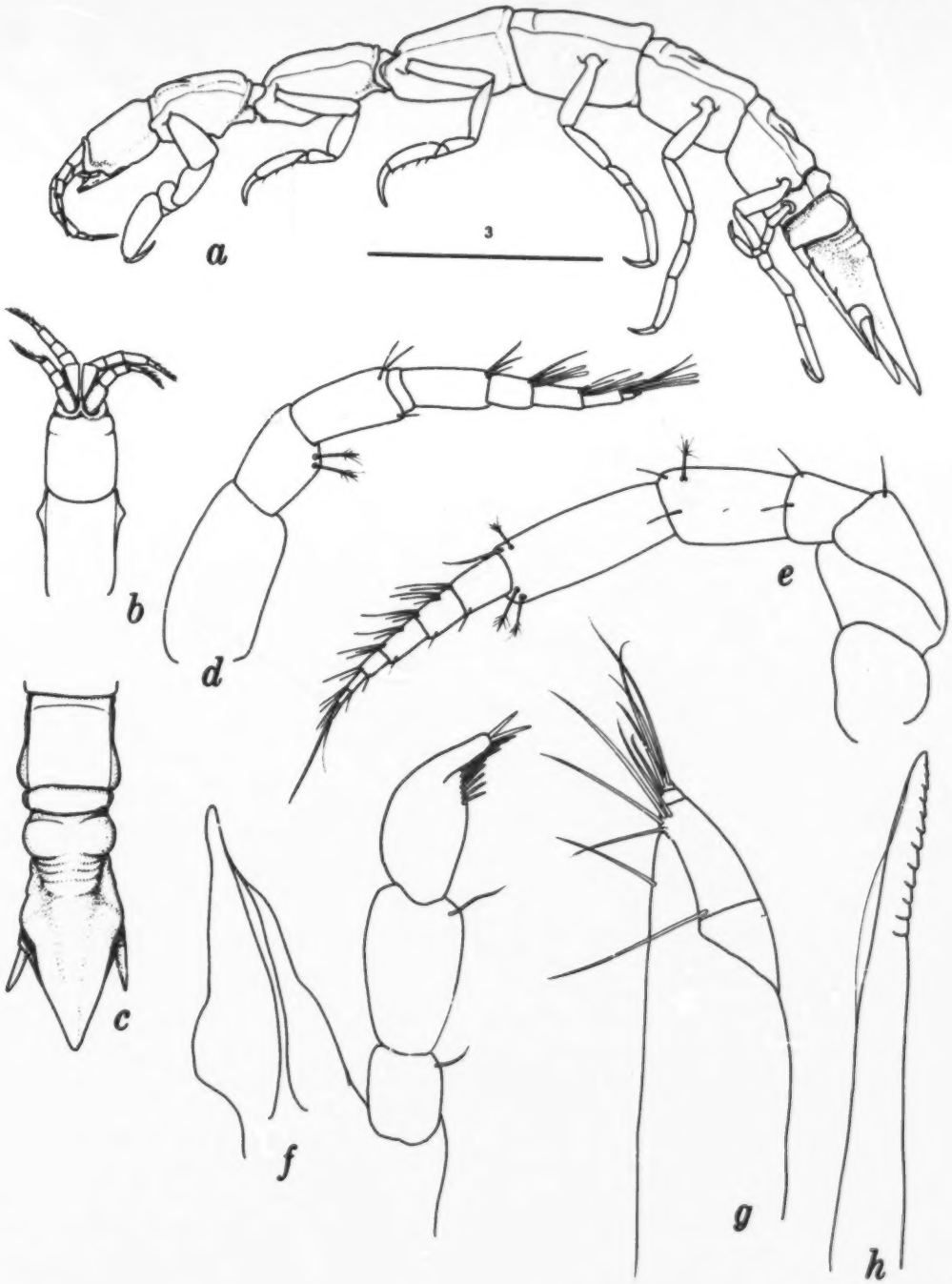

FIGURE 34.—*Pseudanthura recifensis*, new species: *a*, holotype in lateral view; *b*, cephalon; *c*, pleon in dorsal view; *d*, antennule; *e*, antenna; *f*, mandible; *g*, maxilliped; *h*, maxilla.

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FIGURE 35.—*Pseudanthura recifensis*, new species: *a*, pereopod 1; *b*, pereopod 2; *c*, pereopod 7: *d*, pleopod 1; *e*, uropod.

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margin. Pereopod 7 short (with short pereonite 7, probably indicating specimen is post-manca juvenile). Pleopod 1 exopod operculiform, widest at midlength, distal margins bearing plumose setae; endopod one-third width and about four-fifths length of exopod. Uropodal exopod narrowly triangular, distally acute, not reaching inner apex of basis; latter triquetrous, with inner apex acute, bearing four subterminal elongate plumose setae; outer two apices acute-triangular; endopod narrowly triangular, with few plumose setae on inner margin simple setae distally; apex acute.

REMARKS.—This is the first record of *Pseudanthura* from the western Atlantic; the only other Atlantic species is *P. lateralis* (Figure 33). Kensley (1978c:232) summarised the differences between the three described species of *Pseudanthura*. *Pseudanthura recifensis* most closely resembles *P. albatrossae* from the Flores Sea, especially in the overall structure of the pleon, uropod, and first pleopod, but may be distinguished by the relatively more elongate uropodal exopod, the distally acute corners of the uropodal basis, by the concave propodal palm of pereopod 1, and by the narrower pleotelson.

ETYMOLOGY.—The species was collected on the continental shelf off Recife, Brasil–hence the specific name.

Distribution

The suborder Anthuridea (families Anthuridae and Paranthuridae) contains about 52 genera and 200 species. The majority of species come from intertidal-shallow infratidal habitats, and although collecting coverage is still inadequate and patchy, the group would seem to have its highest diversity in the shallow-water tropical environment; for example, 21 species have been collected in shallow Caribbean habitats.

Only 14 genera and about 30 species have been previously recorded from deeper than 250–300 meters in the world's oceans, of which nine genera with 13 species were from the Atlantic. The following list of Atlantic anthurideans includes the three genera and 11 species recorded in this paper.

Species	*Depth*
Family ANTHURIDAE	
Anthelura elongata Norman and Stebbing	1480
Anthelura sulcaticauda (Barnard)	568–800
Cetunthura foveoderma, new species	620
Cyathura profunda, new species	508–2707
Hyssura producta Norman and Stebbing	2900
Malacanthura cantabrica, new species	1739
Malacanthura truncata (Hansen)	516–2870
Ocsanthura gracilis, new species	1500–1700
Ocsanthura vimsae Kensley	350–1934
Quantanthura sinuata, new species	520–550
Valoranthura abyssorum (Norman and Stebbing)	3500–4596
Family PARANTHURIDAE	
Bullowanthura aquitanica, new species	641–860
Calathura brachiata (Stimpson)	10–1597
Leptanthura affinis (Bonnier)	516–2185
Leptanthura argentinae, new species	1002–4392
Leptanthura glacialis Hodgson	50–5216
Leptanthura guianae, new species	516–1487
Leptanthura micrura, new species	587–2494
Leptanthura tenuis (Sars)	50–1410
Leptanthura truncata Richardson	888
Paranthura argentinae Kussakin	399–508
Paranthura costana Bate and Westwood	20–355
Paranthura possessia Kensley	142–2707
Pseudanthura lateralis Richardson	930–3200
Pseudanthura recifensis, new species	587

My own collecting experience indicates that the number of shallow-water forms will be increased considerably as more areas are investigated. While admitting that the deep oceans have been even less well sampled, enough is known about some isopod groups in the deep Atlantic to build reasonable hypotheses of origin and evolution, as has been done for the Asellota (Hessler and Thistle, 1975). The number of deep Atlantic anthuridean records does not allow as comprehensive a view as is possible with the asellotes. One reason for this may be that the anthurideans just are less abundant in the deep sea. This in turn might imply that the group had its origins in shallow habitats, and that relatively few penetrated to the depths, where evolution has continued at a low level. A partial explanation for this low level of evolution may be that the anthurideans are conservative in that, regardless of habitat, they retain the basic cylindrical body shape,

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which imposes restrictions on niche selection. The asellotes on the other hand show a bewildering variety of body forms, which is another aspect of their success in the depths.

The presence or absence of eyes has been used as support for the theory of the in situ deep-sea evolution of some asellote families (Hessler and Thistle 1975; Hessler, Wilson, and Thistle 1979). In those anthuridean genera that have shallow as well as deep-water representatives, eyes are present in all the shallow-water forms, while most of the deep-water forms lack eyes. Thus in the almost cosmopolitan genus *Cyathura*, adaptive radiation probably went from shallow infratidal into the deep sea (*C. profunda*), into estuaries *(C. polita, C. estuaria)*, as well as into groundwater (i.e., cave forms, *C. curassavica*, *C. specus*). In the cave dwellers, as well as in *C. profunda*, eyes are absent.

Malacanthura has several shallow-water species, all possessing eyes; *M. antarctica* from about 500 m in the Antarctic has weakly pigmented and poorly developed eyes, while *M. cantabrica* and *M. truncata* from 500–1700 m in the North Atlantic completely lack eyes. If eye presence/absence is a valid criterion indicative of direction of adaptive radiation, then the presence of eyes in *M. antarctica* and *Calathura brachiata* would argue against high-latitude emergence of these deep-sea forms, as has been postulated for some of the asellotes. Rather, it would seem that *Cyathura* and *Malacanthura* genera are deep-sea pioneers.

In the genus *Leptanthura*, however, all species lack eyes, from *L. hendili* Wolff, 1956, (the deepest recorded anthuridean from 6580 m in the Banda Trench), to littoral forms such as *L. diemenensis* (Haswell) from Australia. Of the approximately 23 species of *Leptanthura*, 16 (76%) occur in depths of more than 200 m. *Leptanthura* may thus be a true deep-sea genus, having several species emerging into shallow water, e.g., *L. glacialis* Hodgson, which occurs at 5000 m in the Argentine Basin, but up to 50 m in the Antarctic.

Other anthuridean genera that are true deep-sea forms (i.e., have as yet no shallow-water representatives and are blind) include *Antheura*, *Cetanthura*, *Hyssura*, *Ocsanthura*, *Pseudanthura*, and *Valoranthura*.

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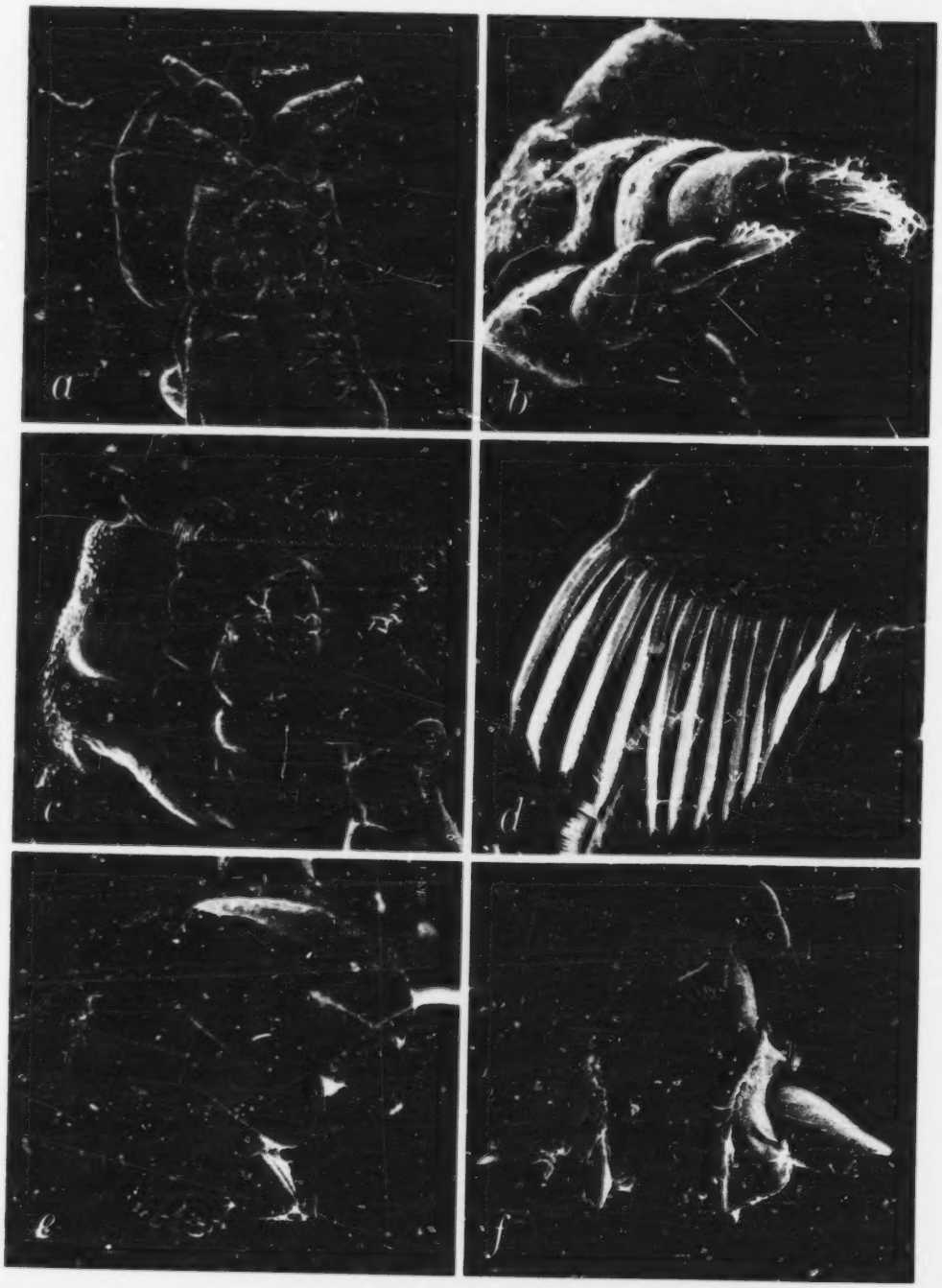

PLATE 1.—*Cyathura profunda*, new species: *a*, cephalon ♀; *b*, antennule and antenna ♀; *c*, ventral view of mouthparts; *d*, spination on terminal mandibular palp segment, *e*, tailfan ♀; *f*, ventral pleon ♀.

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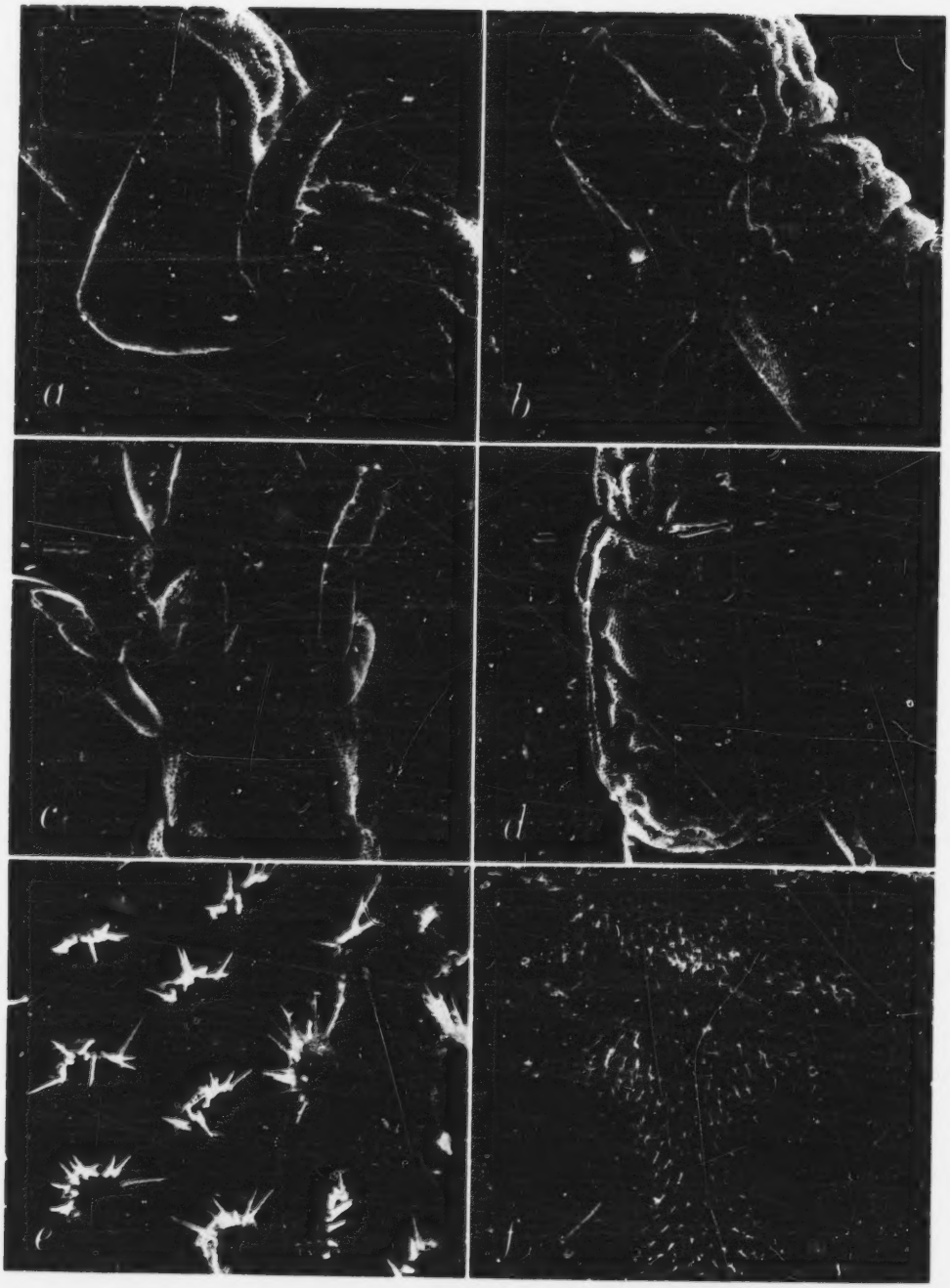

PLATE 2.—*Cyathura profunda*, new species: *a*, pereopod 2; *b*, pereopod 7 and pleon in lateral view; *c*, pereonite 2 ventral view; *d*, pereonite 1 dorsal view; *e*, integumental tubercles enlarged; *f*, statocyst openings.

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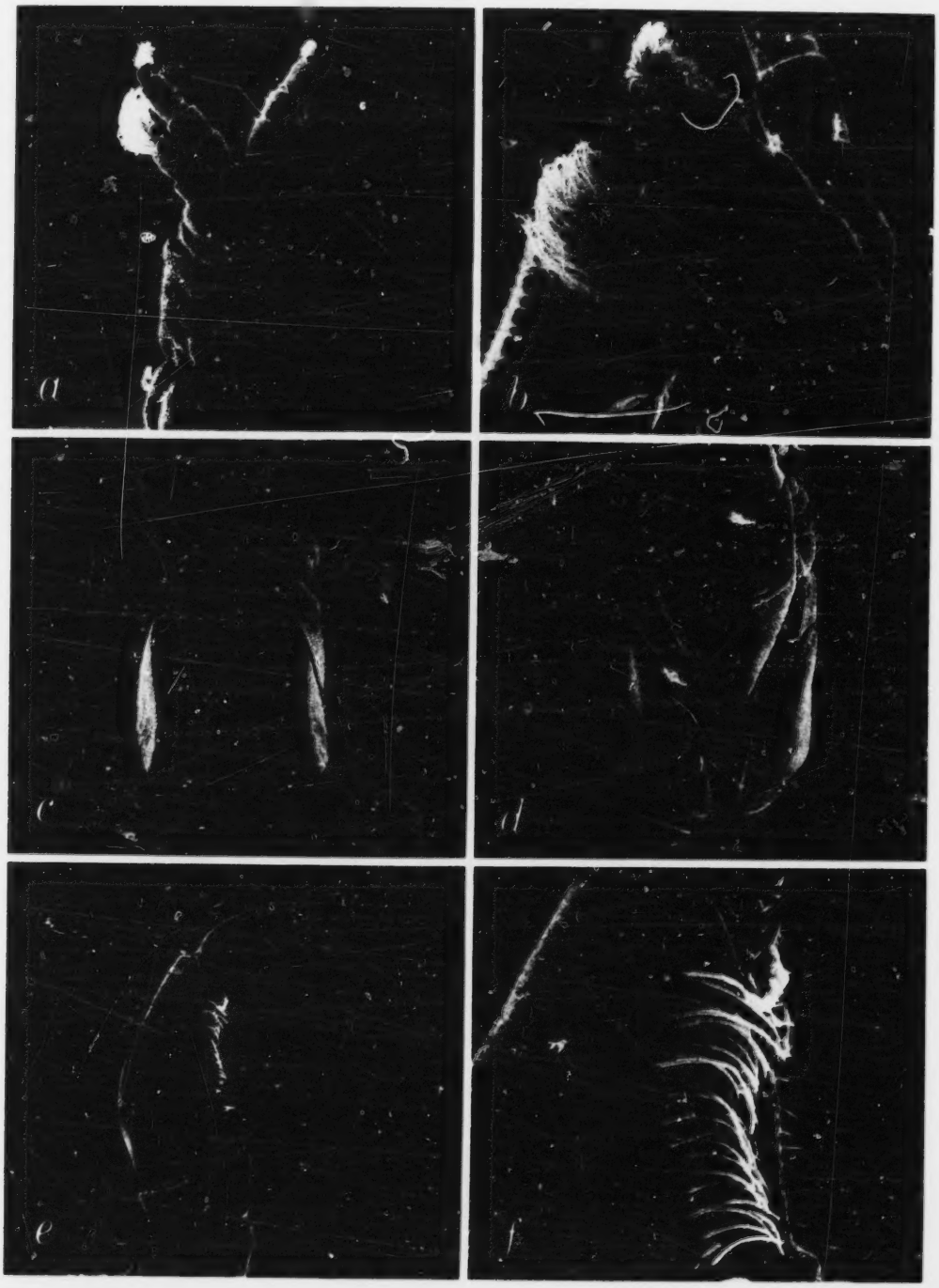

PLATE 3.—*Cyathura profunda*, new species: *a*, cephalon ♂; *b*, antennule and antenna ♂; *c*, tailfan ♂; *d*, ventral pleon ♂; *e*, pereopod 1 ♂ inner surface; *f*, pereopod 1 ♂ palm of propodus.

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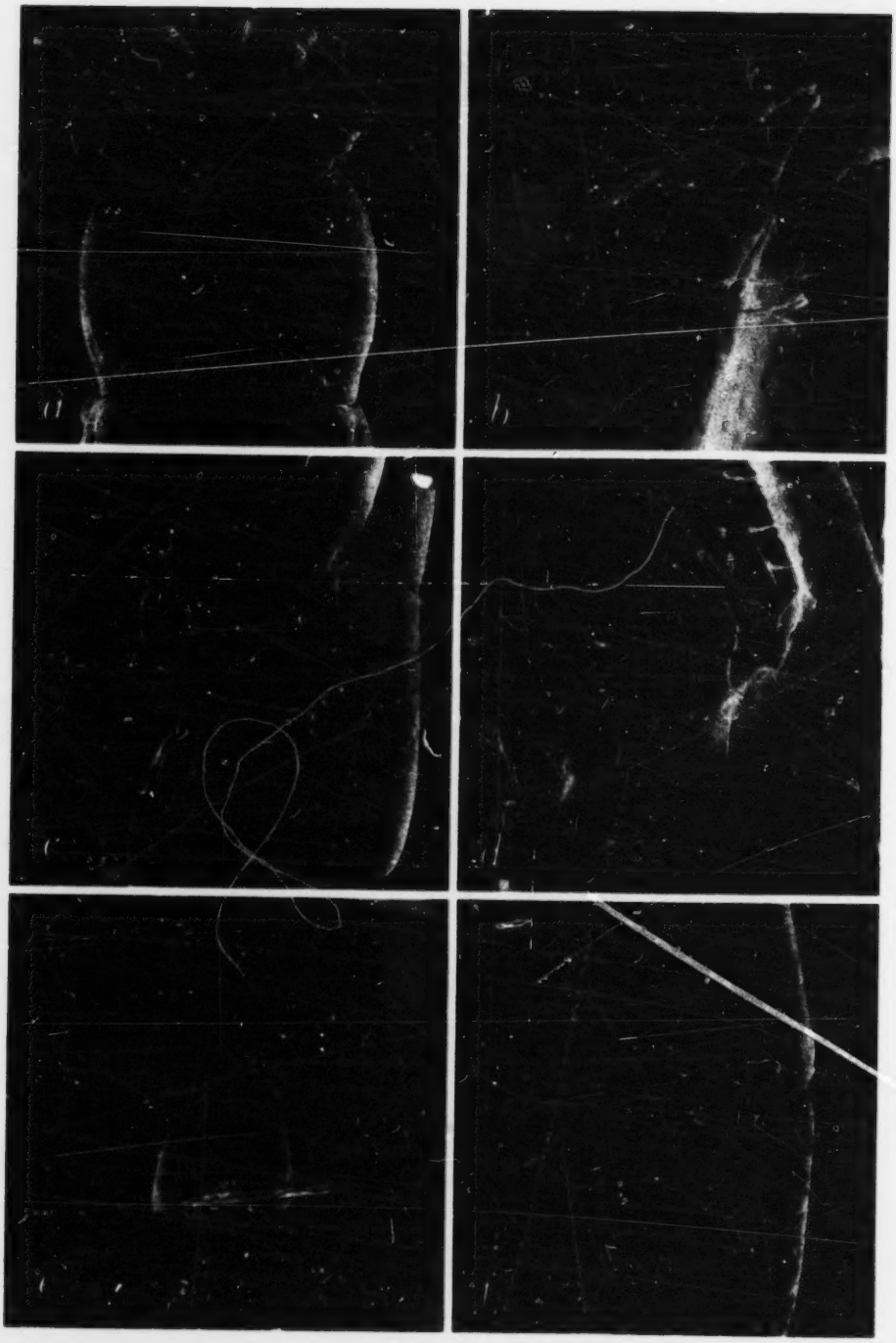

PLATE 4.—*Leptanthura affinis* (Bonnier); *a*, cephalon ♀; *b*, mouthparts; *c*, pereopods 1 and 2; *d*, propodal palm of pereopod 2; *e*, pleon; *f*, pereopod 7.

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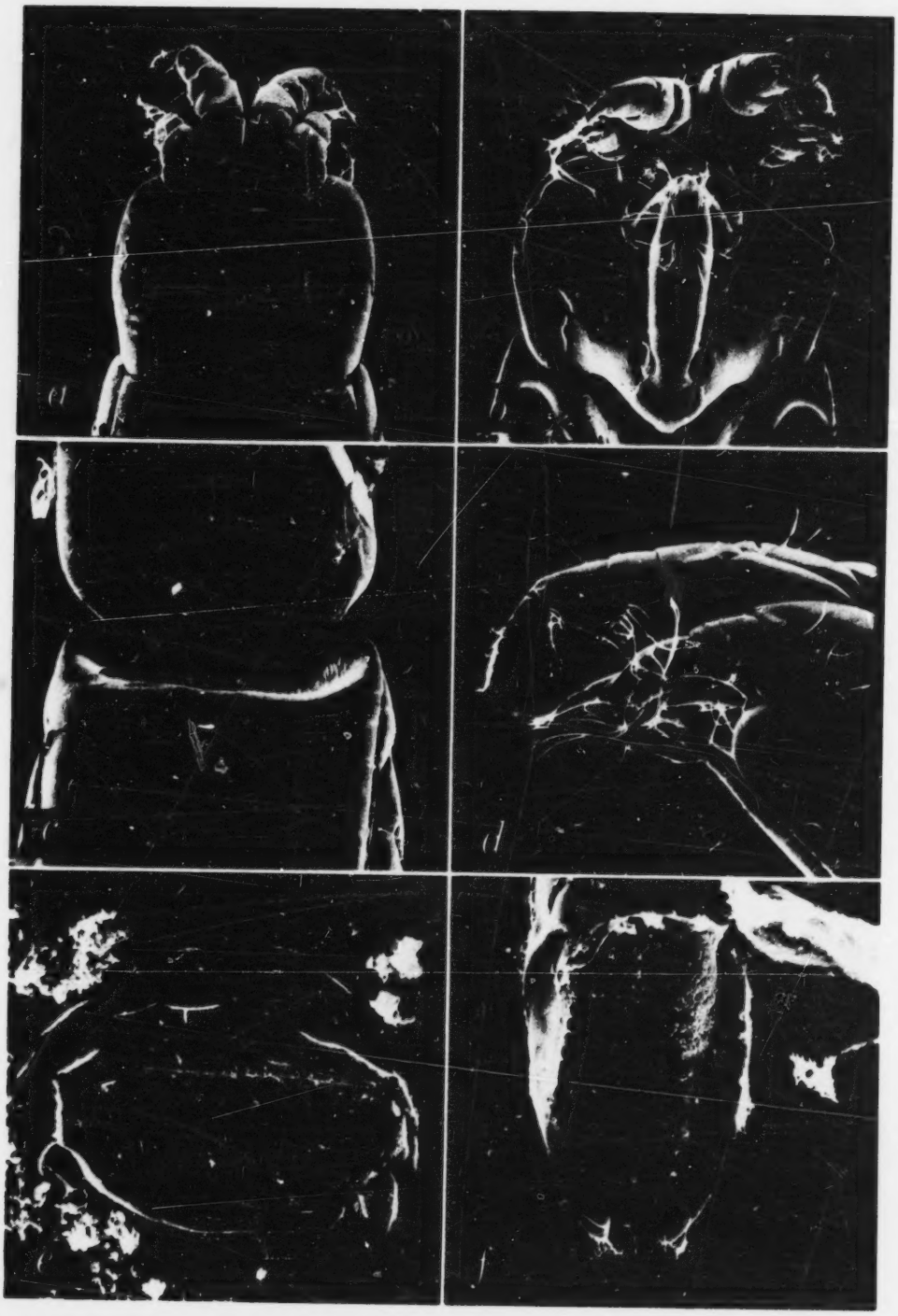

PLATE 5.—*Leptanthura glacialis* Hodgson: *a*, cephalon ♀; *b*, cephalon in ♀ ventral view; *c*, articular area between pereonites 1 and 2; *d*, antenna and antennule; *e*, statocyst aperture; *f*, tailfan.

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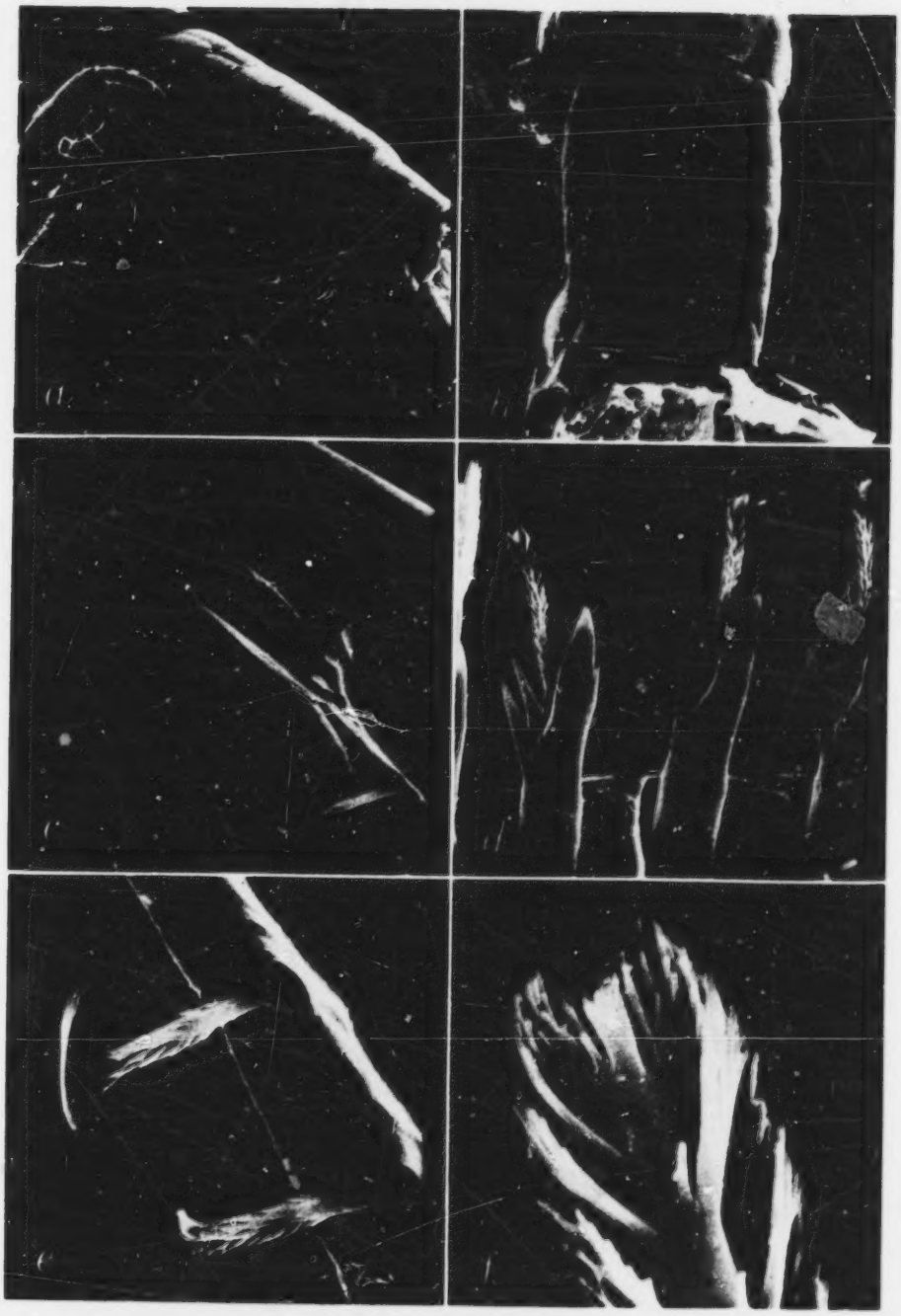

PLATE 6.—*Leptanthura glacialis* Hodgson: *a*, pleon in lateral view; *b*, pleon in dorsal view; *c*, sensory seta at unguis-dactylus join; *d*, sensory spines on pereopod 1 propodal palm; *e*, sensory setae on pereopod 1 dactylus; *f*, apex of sensory seta.

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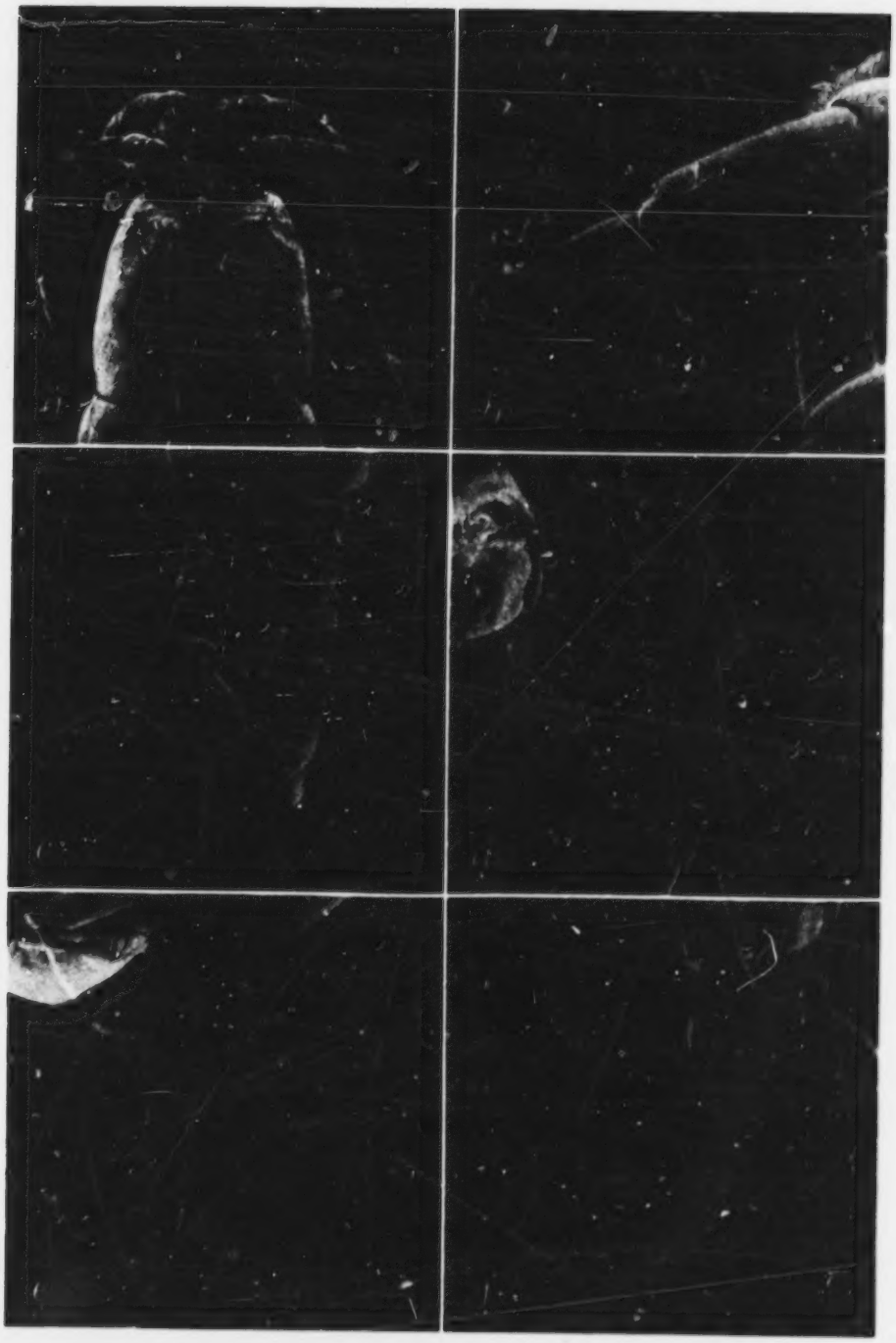

PLATE 7.—*Paranthura possessia* Kensley: *a*, cephalon; *b*, antennal flagellum; *c*, pleon; *d*, dactylus of pereopod 1; *e*, pereopod 7; *f*, propodal palm of pereopod 1.

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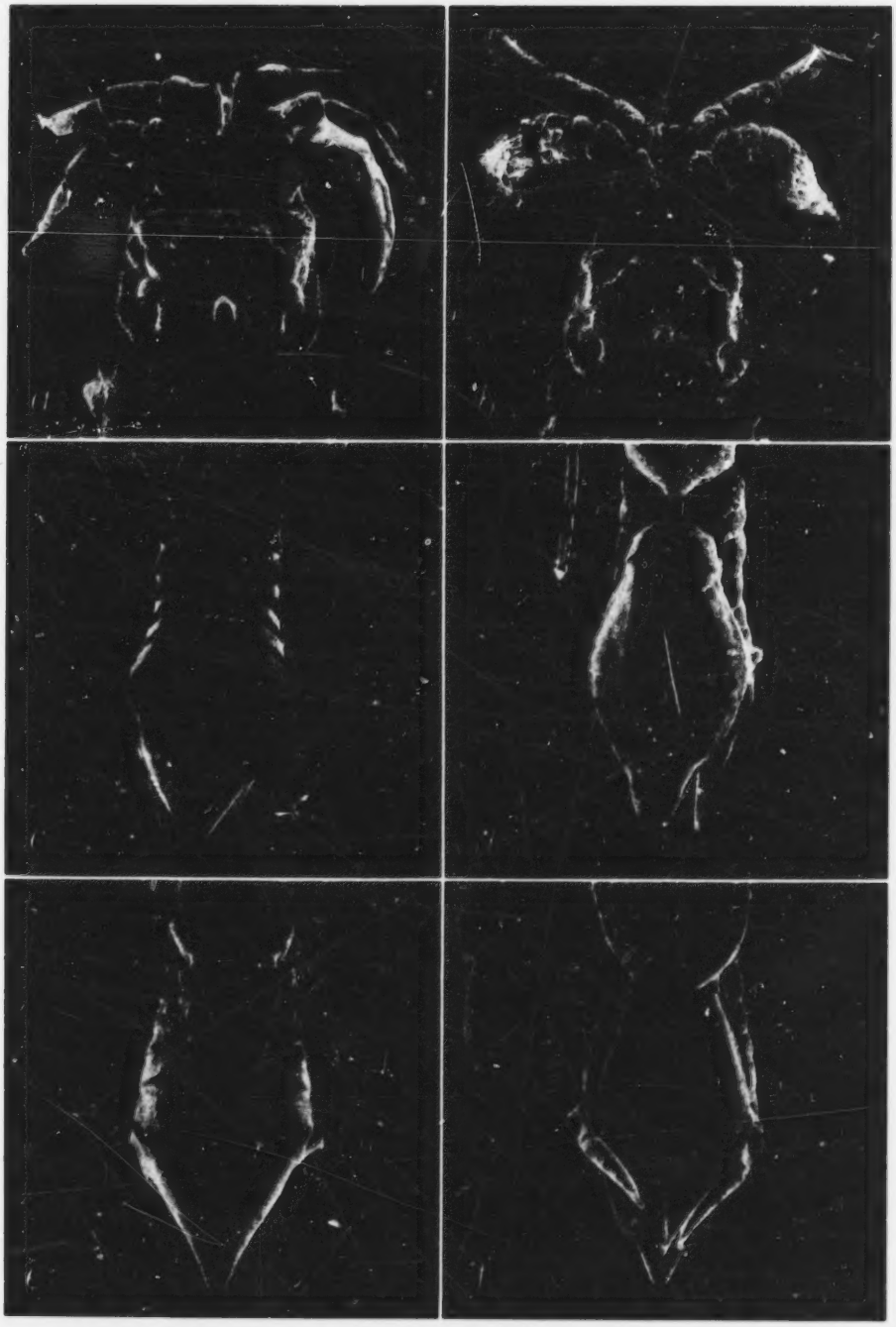

PLATE 8.—*Pseudanthura lateralis* Richardson: *a*, cephalon ♀; *b*, cephalon ♂; *c*, pleon ♂ in dorsal view; *d*, pleon ♂ in ventral view, note protruding copulatory stylet; *e*, pleon ♀ in dorsal view; *f*, pleon ♀ in ventral view.

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PLATE 9.—*Pseudanthura lateralis* Richardson: *a*, articular area between cephalon and pereonite 1; *b*, pereonite 1 in lateral view; *c*, mouthparts; *d*, pereopod 1 ♂; *e*, propodal palm and dactylar margins of pereopod 1; *f*, pereopod 1 ♀.

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